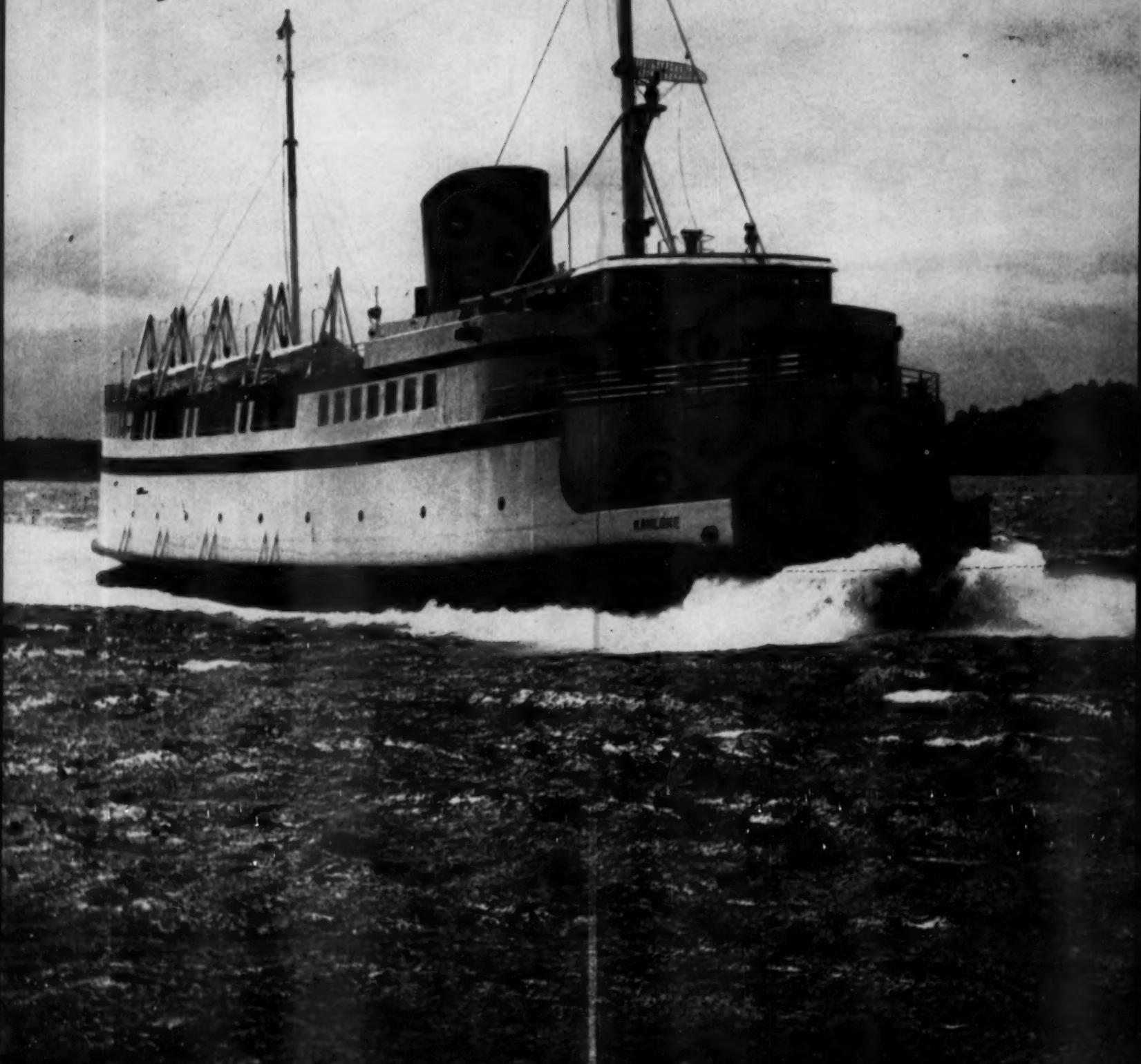


IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

DESERVED PROGRESS



FIVE DOLLARS PER YEAR

AUGUST, 1953

FIFTY CENTS PER COPY

HOW THE RIGHT REDUCES

● The type, size and speed of your Diesels, the conditions under which they operate, and the fuel used — *all* these factors are considered by your Texaco Lubrication Engineer when he recommends the most suitable lubricating oil.

And because Texaco makes *a complete line* of Diesel lubricating oils — the *Texaco Ursa Oil* series — your Texaco Lubrication Engineer can assure you an oil that is *exactly right* for your engines and the fuel you use.

This will mean more efficient operation, cleaner engines, minimum wear, reduced maintenance costs and less fuel consumption.

Call in a Texaco Lubrication Engineer today. Let him help you select the exact *Texaco Ursa Oil* to give you the most efficient performance. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N.Y.



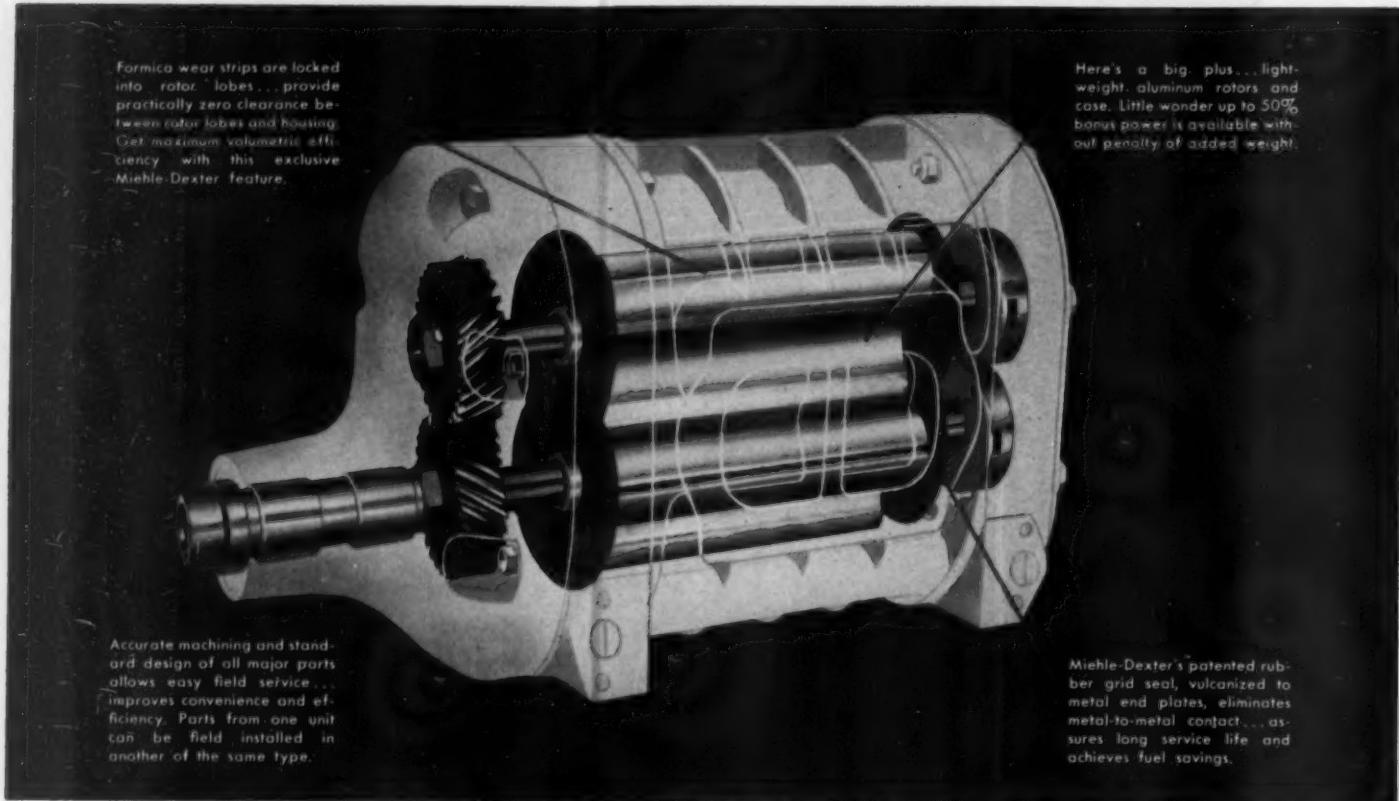
TEXACO

OIL COSTS

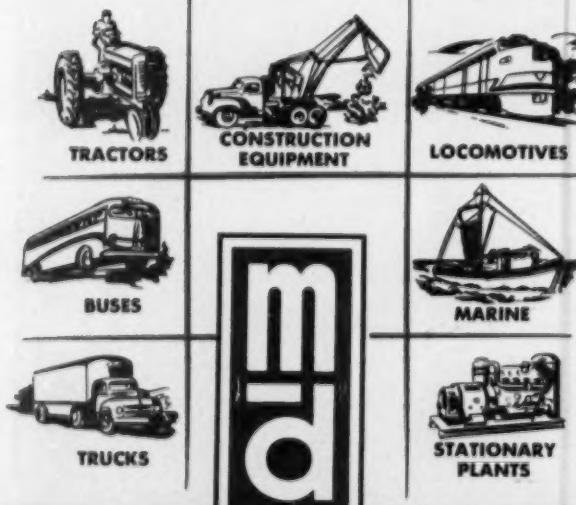


URSA OILS FOR ALL DIESEL, GAS
AND DUAL-FUEL ENGINES

only MIEHLE-DEXTER superchargers give you these 4 big engineering advantages



and add up to 50% more engine horsepower for all these applications too!



The four exclusive features shown above are typical of the big difference between Miehle-Dexter superchargers and other units. Features like these pay off in *bonus power*—up to 50% or more when you put performance-proved Miehle-Dexter superchargers on Diesel or gasoline engines.

More, these features are the key to longer supercharger service life... efficient performance. There's a dividend in fuel economy, too.

Yes, if you want more usable horsepower without additional weight... without sacrificing valuable space, it's time to specify Miehle-Dexter superchargers. For more facts, call or write Miehle-Dexter.

MIEHLE-DEXTER SUPERCHARGER

DIVISION OF THE DEXTER FOLDER COMPANY

100 Fourth Street • Racine, Wisconsin

Right for the Job!

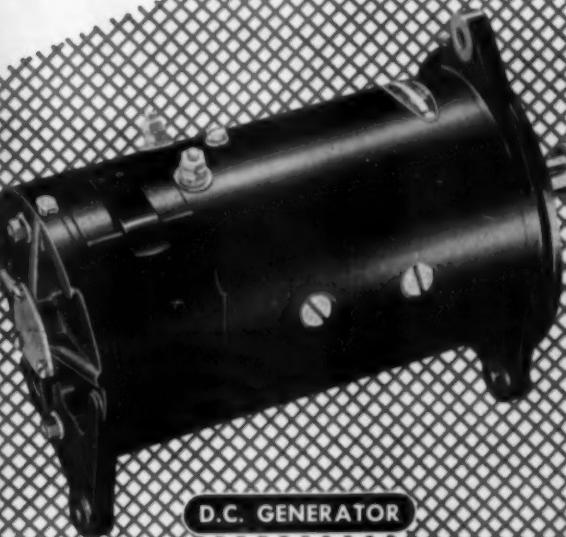


DELCO-REMY HEAVY-DUTY 5 $\frac{5}{8}$ " DIAMETER GENERATORS AND MATCHING REGULATORS

Delco-Remy heavy-duty 5 $\frac{5}{8}$ " diameter generators have made a name for themselves with Diesel users who need units that develop full output at low speeds on governed Diesel engines. These Delco-Remy generators have exceptionally long brush life (100,000 miles or more is common) and, because of durable construction and simple, dependable lubrication system, require minimum maintenance.

Heavy-duty features include an extra-heavy, rigid armature shaft, extra-large brushes and commutator, ball bearings in both commutator and drive end frames, wick-type lubrication with oilers, and forced ventilation of the entire unit.

These generators, with a frame diameter of 5 $\frac{5}{8}$ inches, are available in 6-, 12-, 24- and 32-volt models. Six-volt models have capacities as high as 55 amperes, 12-volt models as high as 50 amperes. The 24- and 32-volt models provide outputs of 20 and 15 amperes, respectively. Matching regulators are available for all models. Specify Delco-Remy heavy-duty generators with mounting brackets and pulleys when ordering new vehicles.



D.C. GENERATOR



REGULATOR

DELCO-REMY

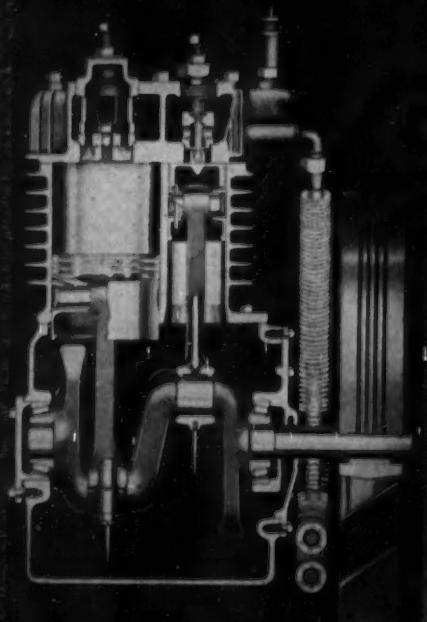
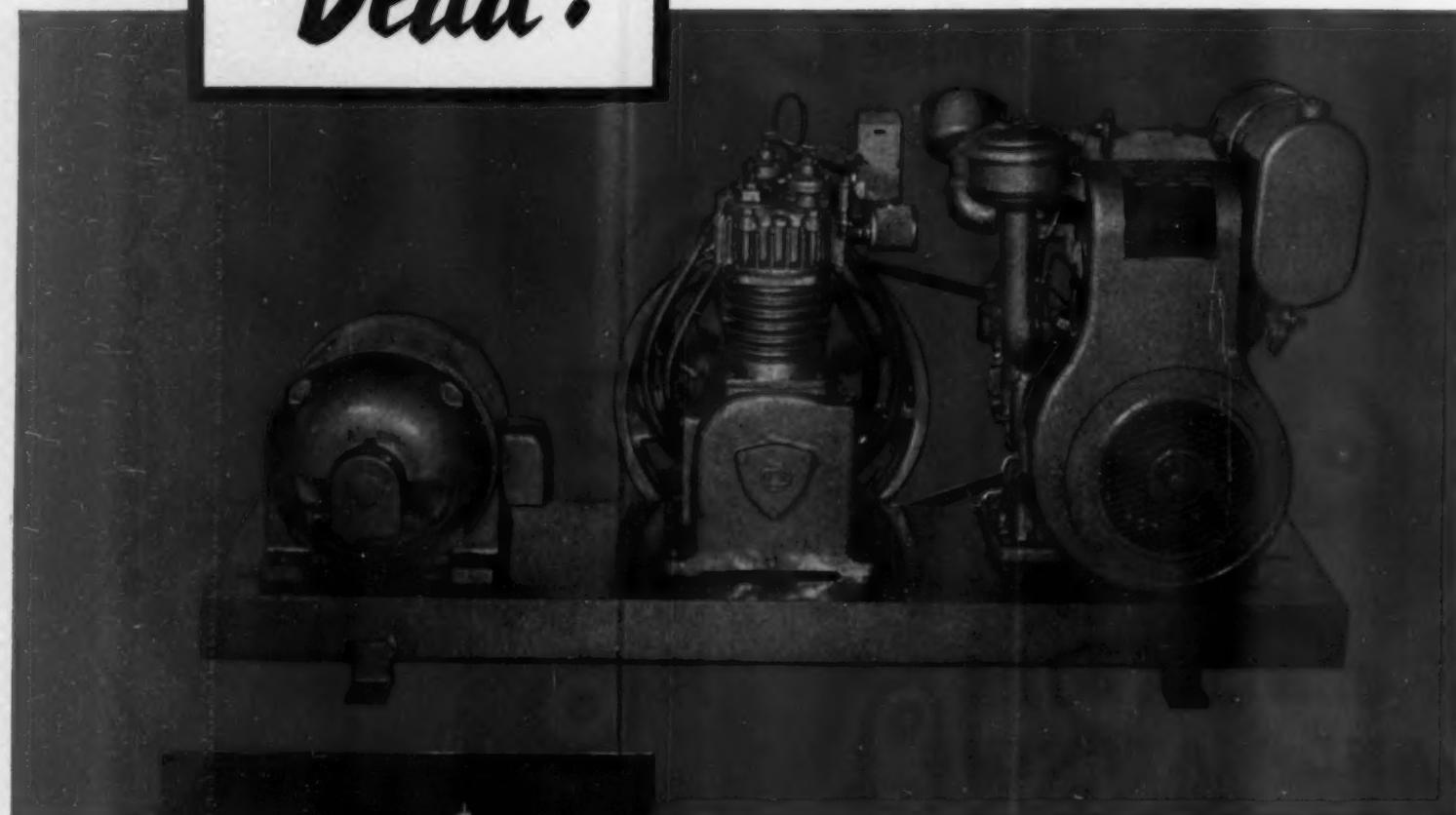
Division, General Motors Corporation
Anderson, Indiana

WHEREVER WHEELS TURN OR PROPELLERS SPIN



**Power
Dead?**

start up anyway!



Simply switch the V-belt from electric motor to gasoline engine.
That's how easy it is to provide emergency starting air during power line failures — with the Gardner-Denver ADD Combination Unit in your diesel plant.

Notice the sturdy compressor details revealed in this cross-section drawing. The ADD is built for dependable service — is backed by 94 years of Gardner-Denver manufacturing experience. Write for full details.

GARDNER-DENVER

SINCE 1859

Gardner-Denver Company, Quincy, Illinois

WE QUALITY LEAD IN COMPRESSORS, PUMPS AND ROCK DRILLS

DIESEL PROGRESS

For stand-by power Delco Generators

Delco generators are designed to serve Diesel power plants effectively . . . and without fail. With a power range of 20 kw through 200 kw, AC and DC, 1200, 1500, and 1800 rpm, Delco generators keep pace with Diesel engineering design and development.

Hospitals, schools, public buildings, carnivals, circuses and outside construction jobs frequently call for power from an independent source. At such times Delco generators prove their dependability for stand-by or portable service. Any of the sales offices listed below will be glad to supply detailed information.



**DELCO
PRODUCTS**

Division of General Motors Corporation, Dayton, Ohio

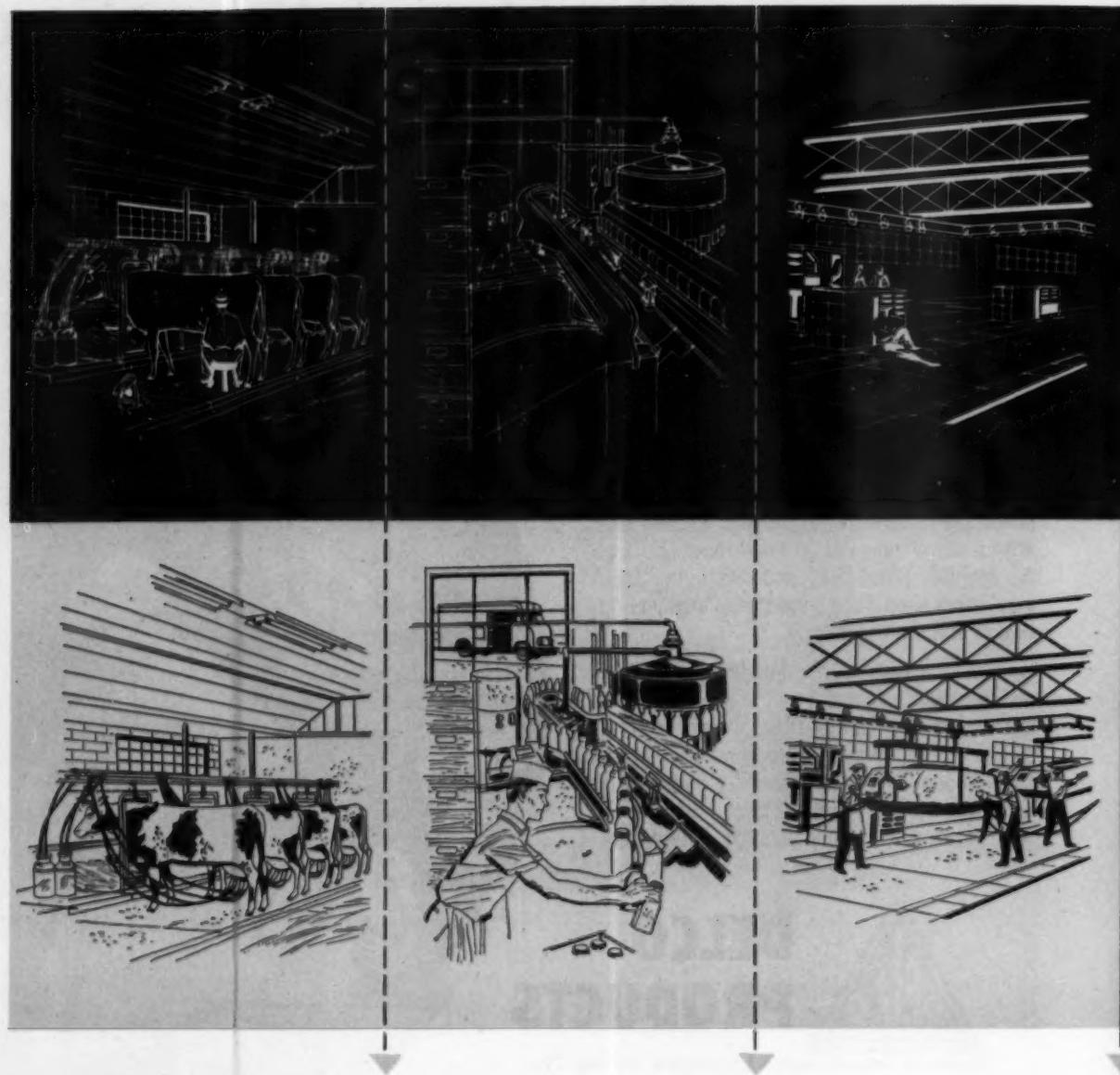
AC GENERATORS
20 kw through 150 kw at 1200 rpm
20 kw through 200 kw at 1800 rpm



SALES OFFICES:
ATLANTA • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT • HARTFORD • PHILADELPHIA • ST. LOUIS • SAN FRANCISCO

DC GENERATORS
20 kw through 90 kw at 1800 rpm
20 kw through 75 kw at 1500 rpm
20 kw through 60 kw at 1200 rpm





What a difference dependable power makes! Farms, dairies, factories, public safety, home conveniences and comfort are typical of the innumerable ways electricity is serving America so vitally.

With the use of electricity doubling in the past decade and expected to double again by 1960, hundreds of communities each year are turning to diesel engines for municipal power plants. They are profiting from these advantages of diesel power:

Flexible—ideal for meeting long range or immediate needs as primary, additional or standby power sources . . . can be installed wherever needed and put into service

in a much shorter time than any other power source.

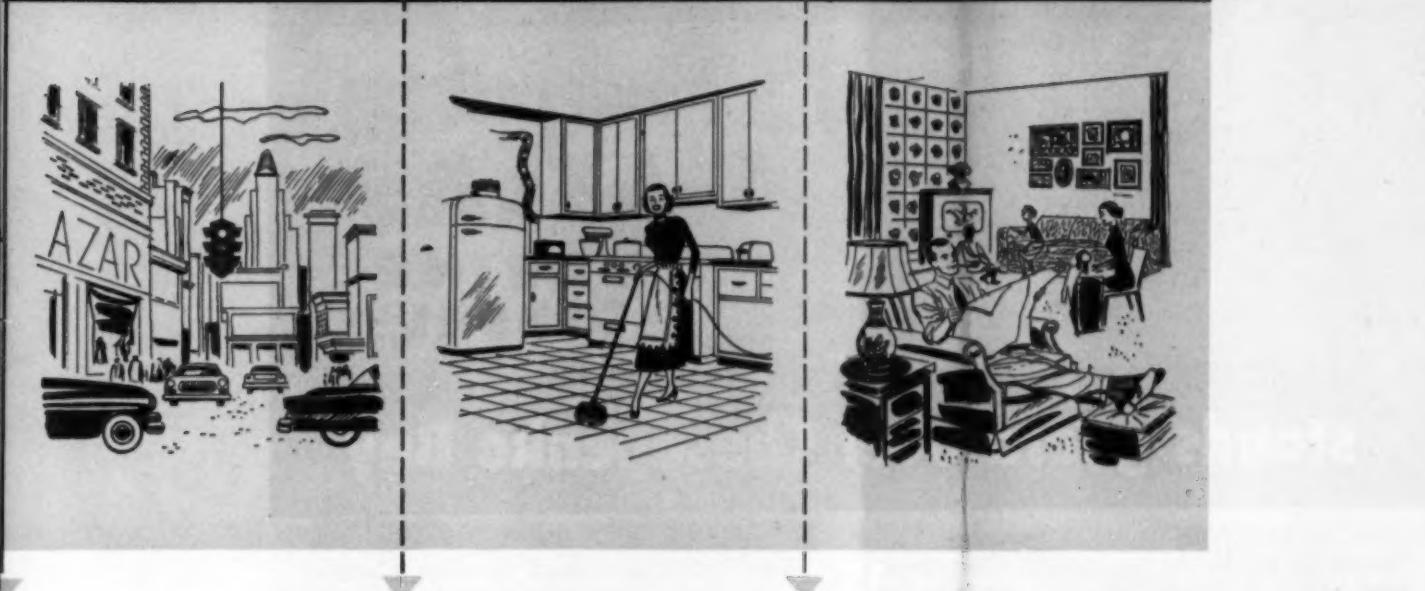
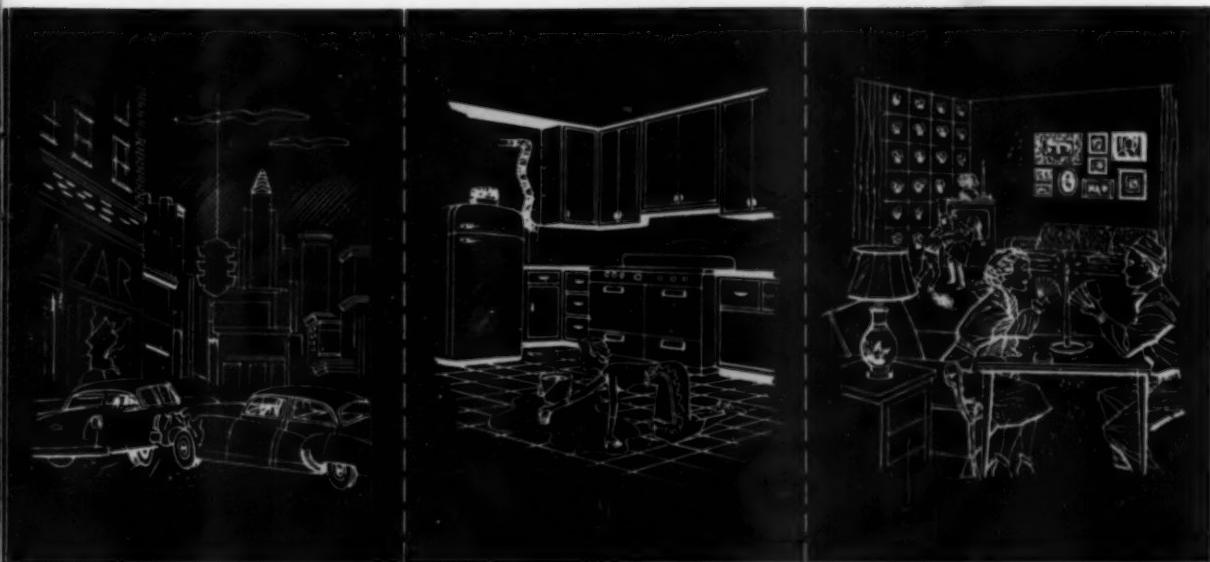
Economical—requires minimum initial investment, uses low cost fuels, needs little maintenance, and can be started up in a matter of minutes, burning no fuel at all while waiting the call to service.

Dependable—as prime movers, diesels are unfailingly reliable . . . as supplements to steam or hydro plants, diesels stand ready for instant service in case of line failure or voltage drop.

Do you have economical electric power that can be depended on to maintain productivity, health, comfort and security in your community?

BALDWIN-LIMA-HAMILTON

HAMILTON WORKS • HAMILTON, OHIO



source.
ment,
n be
at all

ngly
ants,
line

HAMILTON 21-SA ENGINES with 21½" bore and 27½" stroke provide more power with less fuel . . . either dual fuel or straight diesel. Built 5 to 12 cylinders with net horsepower range from 2250 to 5450. For complete description write for Booklet 21SAI.

For dependable power it's diesels . . . and in diesels it's Baldwin-Lima-Hamilton . . . backed by more years of designing and building diesel engines than any other maker. For example, this large Hamilton engine, outstanding in its class for twenty years, has been completely redesigned . . . its revolutionary combustion and scavenging system enables it to give more horsepower per cylinder size and engine speed than any other equivalent engine and burn the heaviest low grade fuels with a clean exhaust.



U.S. Coast Guard Lightship "Overfalls" stands guard over the Chesapeake Bay navigation channels.

Model 45 Atlas 8 cylinder 4-cycle Super-Charged Diesel, which powers the Lightship "Overfalls."



LIGHTSHIP #605 "OVERFALLS"

Powered by
ATLAS
MARINE
DIESEL

stands guard over Chesapeake Bay

Through fair weather and foul, the U.S. Coast Guard keeps watch over the approaches to major ports and harbors so that shipping schedules can be maintained regardless of the elements.

U.S.C.G. lightships, like the "Overfalls," stand by to protect shipping at every point where pilots might need navigational aids.

Obviously, these lightships must have dependable power plants—proved-in-service engines such as the Atlas Marine Diesel which the U.S. Coast Guard selected to keep the

"Overfalls" in action through the roughest weather.

For many years Atlas Marine Diesels have been used extensively in river and harbor craft operated by the U.S. Coast Guard. Their serviceability and dependability have been proved time after time under all sorts of operating conditions.

When you specify and install Atlas and Superior Marine Diesels in work boats of any type you can expect the same kind of service. You'll find it worthwhile to write for complete information now.



Distributor of Diesels in the U.S.A.

ENGINE DIVISION
THE NATIONAL SUPPLY COMPANY
PLANT AND GENERAL OFFICES:
SPRINGFIELD, OHIO

SALES AND SERVICE POINTS:
Gloucester, Massachusetts
Kansas City, Mo.
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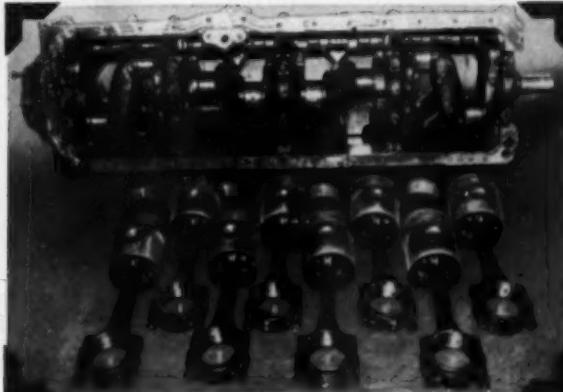
THE ENGINEER'S REPORT

DATA
LUBRICANT RPM Delo Oils
UNIT 8 cyl. 165 H.P. gasoline engine
SERVICE Suburban bus
CONDITIONS Many traffic stops, cold engines,
 heavy pulls on hills
FIRM The Gray Line, Inc. of
 San Francisco

Over 83,000 stop-and-go miles before overhaul!



RPM DELO SPECIAL LUBRICATING OIL cuts operating costs by keeping engines clean and reducing wear in more than 400 busses and cars operated in the San Francisco Bay area by The Gray Line, Inc. Overhauled for the first time after 83,579 miles in hilly San



Francisco, the bus engine above showed only 0.0015 inch average wear on mains, only 0.009 average taper in cylinders...despite a heavy-traffic run, many stops.



NO STUCK OR BROKEN RINGS were found on any of the eight pistons. Con-rod bearings were unscored and piston walls lacquer-free, as this photo shows.

REMARKS: Besides "Sightseers," Gray Line operates an airport limousine service, charter busses, chauffered limousines and U-drive cars. Mr. P. J. McNamee, Mgr. of Operations, says, "RPM DELO Oil has reduced operating costs greatly by keeping our engines clean and reducing wear." There is an RPM DELO Oil to meet every heavy-duty engine operating condition.

NOW...

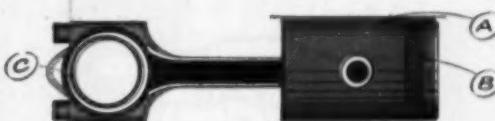
You can cut engine wear rate as much as 85%



FREE BOOKLET on the RPM DELO Oils gives you complete information. Write or ask for it today.

TRADEMARK "RPM DELO" REG. U.S. PAT. OFF.


How RPM DELO Oils keep engines clean and prevent wear



- A. Contain special additives that provide metal-adhesion qualities...protect parts whether hot or cold, running or idle.
- B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean...helps prevent piston scuffing.
- C. Special compounds stop corrosion of any bearing metal and foaming in crankcase.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • **STANDARD OIL COMPANY OF TEXAS**, El Paso
THE CALIFORNIA OIL COMPANY, Barber, New Jersey • **THE CALIFORNIA COMPANY**, Denver 1, Colorado

In this 470-mile, 82,000-barrel per day line **ROSS EXCHANGERS COOL LUBE OIL IN ALL 9 NORDBERG ENGINES**

On duty on a major 1000-mile pipe line, this Nordberg spark ignition gas Duafuel engine is one of nine that power the pumping of 82,000 barrels of refined products a day over a 470-mile span.

Rated 1600 hp at 400 rpm, each of these 4-cycle, variable compression Nordberg engines has been outfitted with a Ross Type CP Exchanger. Safe, dependable lube oil temperatures are thus assured.

Ruggedness, repeatedly proved, has for years made Ross Exchangers the choice for numerous types and makes of equipment: Compressors, turbines, centrifugal pumps, speed increasers, truck engines, torque converters, hydraulic machinery. Pre-engineering and standardization enable meeting a broad range of requirements . . . promptly!

More information is quickly available in Bulletin 2.1K1. Write.

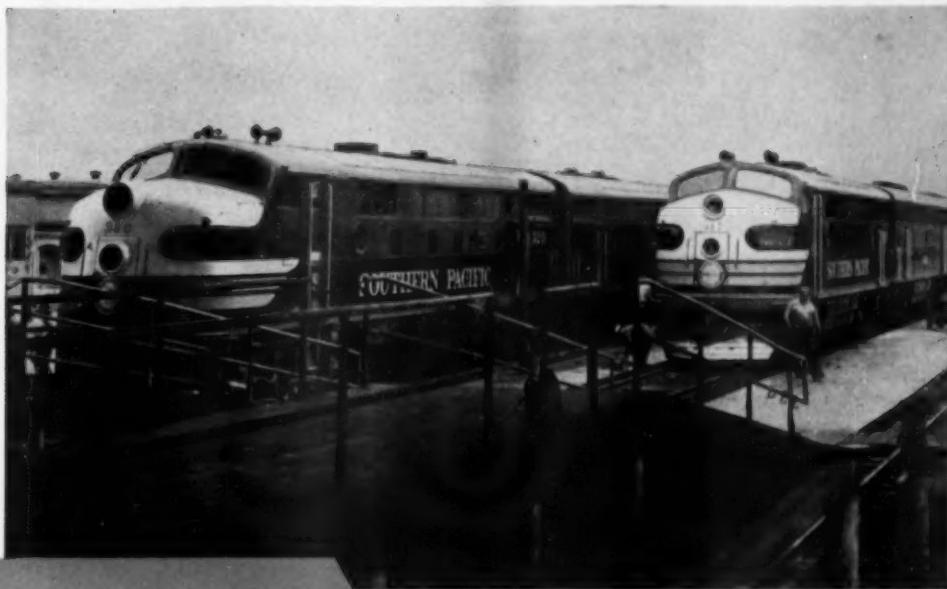


Kewanee-Ross Corporation
DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION
1425 WEST AVENUE • BUFFALO 13, N. Y.
In Canada: Kewanee-Ross of Canada Limited, Toronto 5, Ont.



Serving Home and Industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS

The oil with *3-way action*
that keeps railway Diesels clean



- 1 Fights piston ring belt deposits
(effective detergent action).
- 2 Resists sludging (high stability).
- 3 Prevents hard deposits on piston
crowns (base stock quality and
refining methods).

GULF DIESELMOTIVE OIL

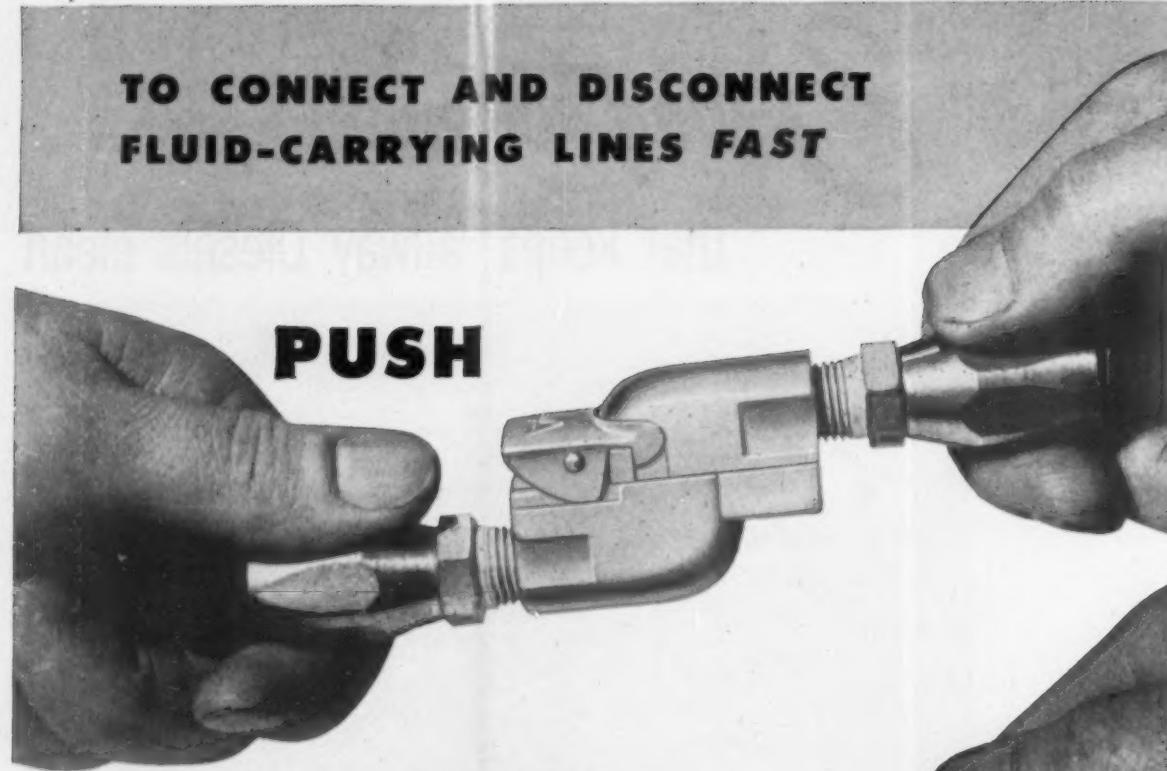
These are the reasons why Gulf Dieselmotive Oil protects against the accumulation of harmful deposits on compression and oil-control rings, on piston crowns, and in ports. Because engines lubricated with Gulf Dieselmotive Oil stay cleaner, they use less oil and require ring jobs less often. This means lower maintenance costs and less time off the road. For further information, write, wire, or phone your nearest Gulf office.

GULF OIL CORPORATION
GULF REFINING COMPANY
PITTSBURGH 30, PENNSYLVANIA



**TO CONNECT AND DISCONNECT
FLUID-CARRYING LINES FAST**

PUSH



PULL



Aeroquip

SLIDE-SEAL COUPLINGS

This Aeroquip development saves you time and money!
LOW COST . . . Aeroquip Slide-Seal Couplings connect and disconnect fluid-carrying lines instantly assuring full flow of fluids when connected, and perfect seal of each half when disconnected.

LIGHTWEIGHT AND COMPACT . . . They are ideal for use in confined areas and may be used to advantage in a wide variety of applications.

SIMPLE DESIGN . . . Only four working parts and two "O" rings assure positive performance and foolproof operation.

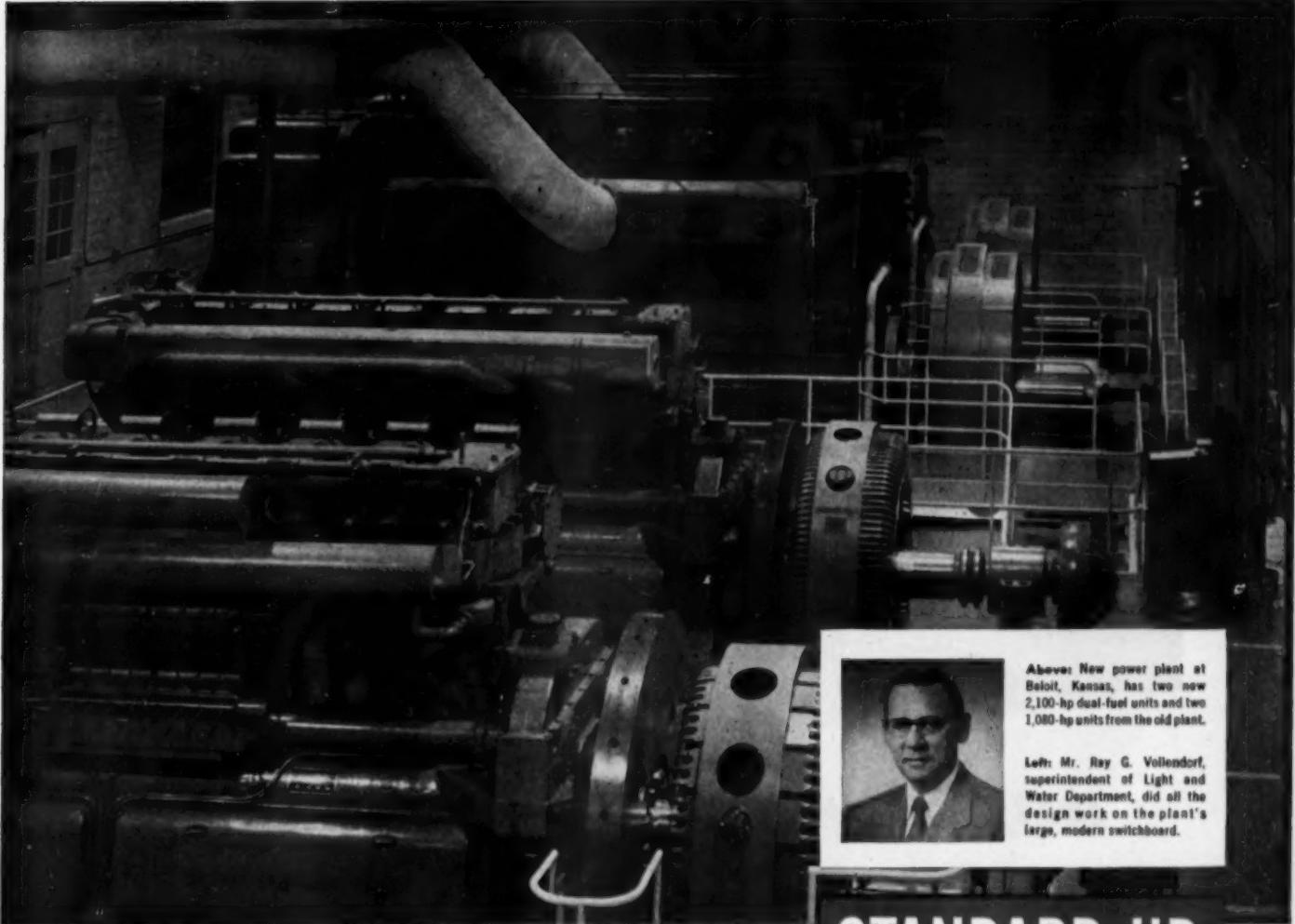
ADAPTABLE for use with many fluids including hydraulic fluids, hot oil, crude and fuel oils, anti-freeze solutions, gasoline, Diesel fuels, air, water, and other fluids.

Descriptive literature is available . . . please write.

AEROQUIP CORPORATION, JACKSON, MICHIGAN

SALES OFFICES: BURBANK, CALIF. • DAYTON, OHIO • HAGERSTOWN, MD. • HIGH POINT, N.C. • MIAMI SPRINGS, FLA.
MINNEAPOLIS, MINN. • PORTLAND, ORE. • WICHITA, KAN. • TORONTO, CANADA

AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD



Above: New power plant at Beloit, Kansas, has two new 2,100-hp dual-fuel units and two 1,080-hp units from the old plant.

Left: Mr. Ray G. Vollendorf, superintendent of Light and Water Department, did all the design work on the plant's large, modern switchboard.

STANDARD HD
TRADE MARK
OIL

New Beloit, Kansas, plant gets record low maintenance with...

● Acclaimed as one of the municipal showplaces of the Midwest, the new power plant at Beloit, Kansas, is going itself one better in actual performance.

The decision of Mr. Ray Vollendorf, plant superintendent, and city officials to switch to dual-fuel operation has paid dividends. Dual-fuel operation of the two new 2,100-hp units and a 1,080-hp converted unit has reduced fuel cost per kilowatt hour by more than 50%.

Another decision has brought its reward. To STANDARD HD Oil went the job of lubricating the plant's four diesels. Now, after nearly two years' operation, Mr. Vollendorf reports that crankcases are as clean as the day the diesels were placed in service. No rings or bearings have needed to be replaced. Visibility of tool marks on the rings and the over-all excellent condition of the engines indicate that

many more hours of service are possible before any overhaul or replacement of parts will be required.

Including the two years' operation of the new plant, the experience of Beloit, Kansas, municipal officials with Standard Oil products covers 20 years. That experience testifies to the satisfaction and benefits you'll realize through Standard Oil's high quality products and outstanding service. You can reach the Standard lubrication specialist in your area of the Midwest by phoning your local Standard Oil office. Or, write: Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois.

STANDARD OIL COMPANY



(Indiana)

Operator reports:



One of 3 Euclid twin-engine scrapers. Twin application is made possible by Allison TORQOMATIC Drives.

25,900 trouble-free hours!

BACK in July 1950, the George M. Brewster Company, Inc., put to work three 18-yard scrapers equipped with Allison TORQOMATIC DRIVES. At the same time, this New Jersey contractor converted four 13-yard bottom-dump trucks from mechanical drives to TORQOMATIC DRIVES.

And to date these seven units have piled up 25,900 trouble-free hours—a record far surpassing experience with mechanical drives.

This high-availability record has paid big dividends by lowering operating costs. Performance records like this tell why many operators are now insisting on Allison TORQOMATIC DRIVES in their new equipment. If you are not familiar with all the advantages of these drives, get the full details from your equipment manufacturer or dealer or write to:

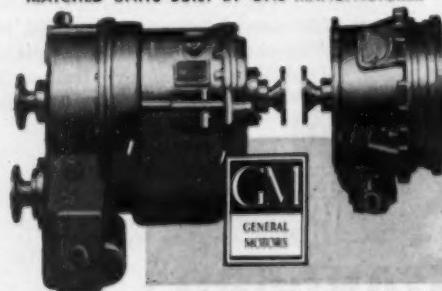
ALLISON Division of GENERAL MOTORS
Box 894DD, Indianapolis 6, Indiana

ALLISON TORQOMATIC DRIVES

Unbeatable Team for Maximum Operating Economy

- * Quick-shifts at full throttle with fingertip hydraulic control.
- * Holds power to load at all times—no clutch pedal to push—no gearshift guess.
- * Cuts maintenance cost by absorbing shock—eliminates engine lugging—prolongs equipment life.
- * Only torque converter-transmission team designed to work as a unit and built by one manufacturer.

MATCHED UNITS BUILT BY ONE MANUFACTURER



Allison **TORQOMATIC DRIVES**



COMPACT, EFFICIENT HYDRAULIC DRIVES FOR CRANES • TRUCKS • TRACTORS • SHOVELS • SCRAPERS • DRILLING RIGS

Higher heat transfer efficiency year...after year...after year!

Trane fin and tube are "joined forever"

There is just no substitute for the *mechanically bonded* fin and tube when it comes to producing year-in, year-out efficiency in dry-type fluid cooling.

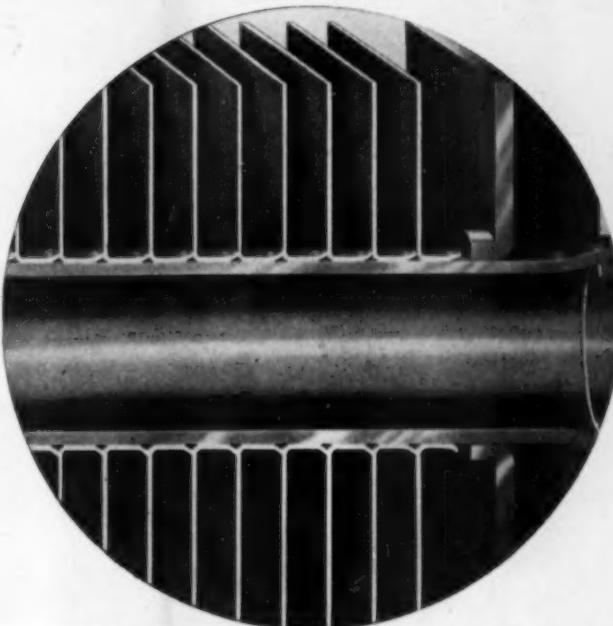
This fin and tube construction, developed and pioneered by TRANE, provides an extra heat transfer contact that lasts the life of the unit. No solder is used. Result: TRANE Dry-Type Fluid Coolers perform more efficiently year after service-free year.

Flat plate fin construction in these TRANE units gives other advantages. It offers less resistance to air flow and thus reduces fan horsepower required. It stays clean much longer than other types of fin surface. Any dirt or lint collected will be on the leading edge of the fin where it can be brushed off easily.

A variety of special corrosion-resistant metals can be used to meet your requirements exactly. And, for a wide range of applications, you'll find a complete line of TRANE Dry-Type Fluid Coolers in over 22 stock models and sizes, both vertical and horizontal.

Be sure you have all the facts on TRANE Fluid Coolers—and know the reason for their higher efficiency and lower per year cost—before you plan your next job.

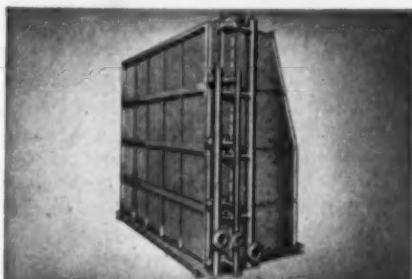
Call your nearest TRANE Sales Office, or write The TRANE Co., La Crosse, Wis. for Bulletin DS-395.



These fins cannot loosen . . . despite a million expansions and contractions. They're *mechanically bonded*. The tube is expanded against the fin collars with tremendous internal pressure. This results in a union as strong and permanent as the metal itself. This strength, plus the extra heat transfer efficiency gained with the metal-to-metal contact gives TRANE Fluid Coolers a longer life and higher efficiency year after year.



TRANE GC Fluid Cooler, fan diameters from 6' to 16'.

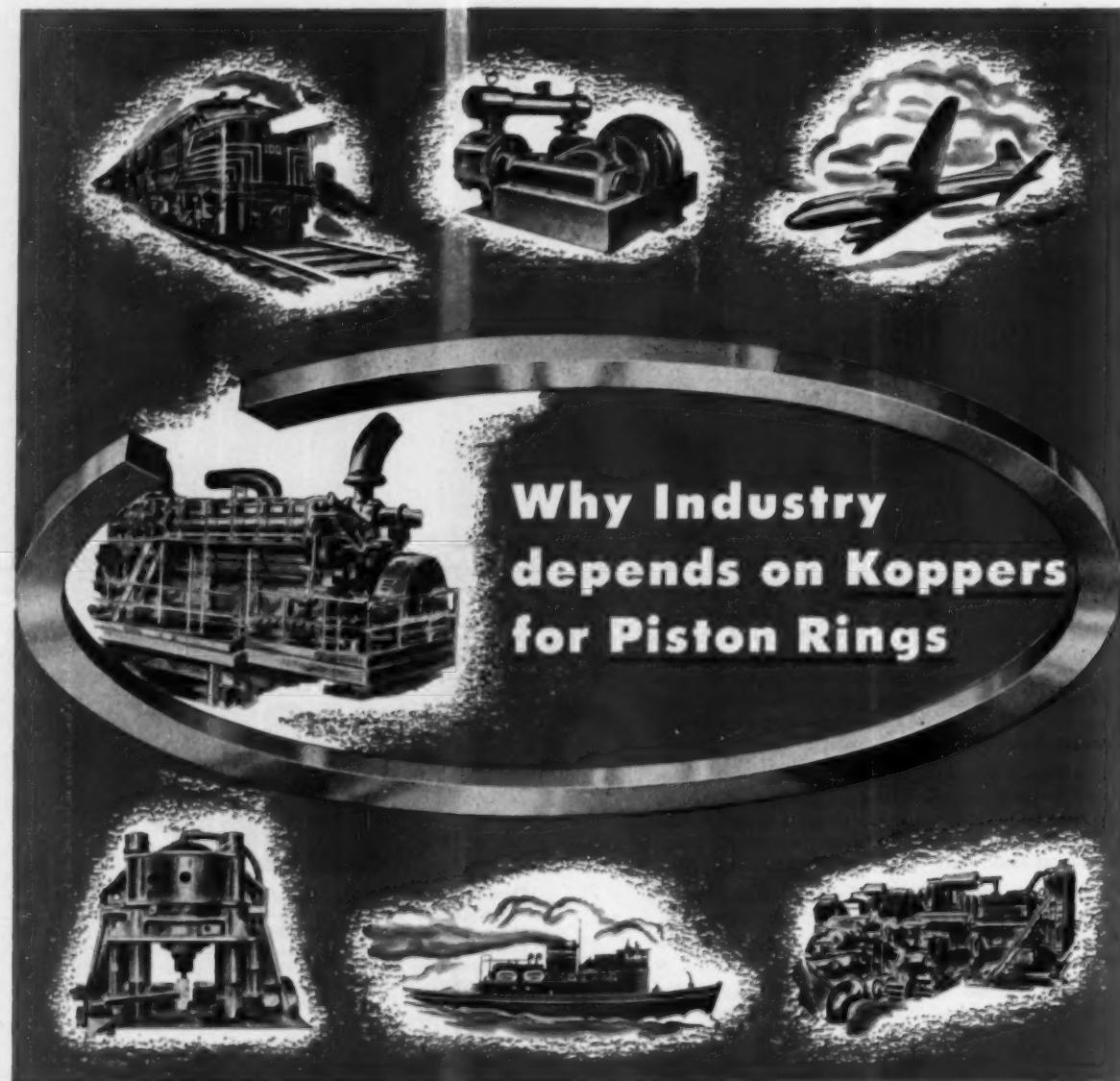


TRANE EC Fluid Cooler, 14 sizes, fan diameters from 18" to 120".

TRANE dry-type fluid coolers

can cut your cooling costs!

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT
The Trane Company, La Crosse, Wis. • East Mfg. Div., Scranton, Penn. • Trane Co. of Canada, Ltd., Toronto • 87 U. S. and 14 Canadian Offices



Koppers manufactures piston rings in every size, of every type, for every industrial and aircraft purpose.

FROM everywhere in industry come reports of savings in time, labor and money through the use of Koppers Rings in diesel and gas engines, hydraulic presses, compressors and other industrial equipment. That's because Koppers research and engineering keep up with modern advances in engine and equipment design by constantly improving piston ring materials and manufacturing methods.

Koppers K-Iron® Rings are made of a high-grade, closely-controlled material that imparts improved wear properties and is surface treated chemically as an anti-scuffing aid. They are made in diameters to 120" in a variety of joint

types. Koppers Porous Chrome* Rings hold and distribute oil during break-in, quickly wear to best possible seating...cut cylinder wear up to 50%, last 4 times as long as ordinary rings!

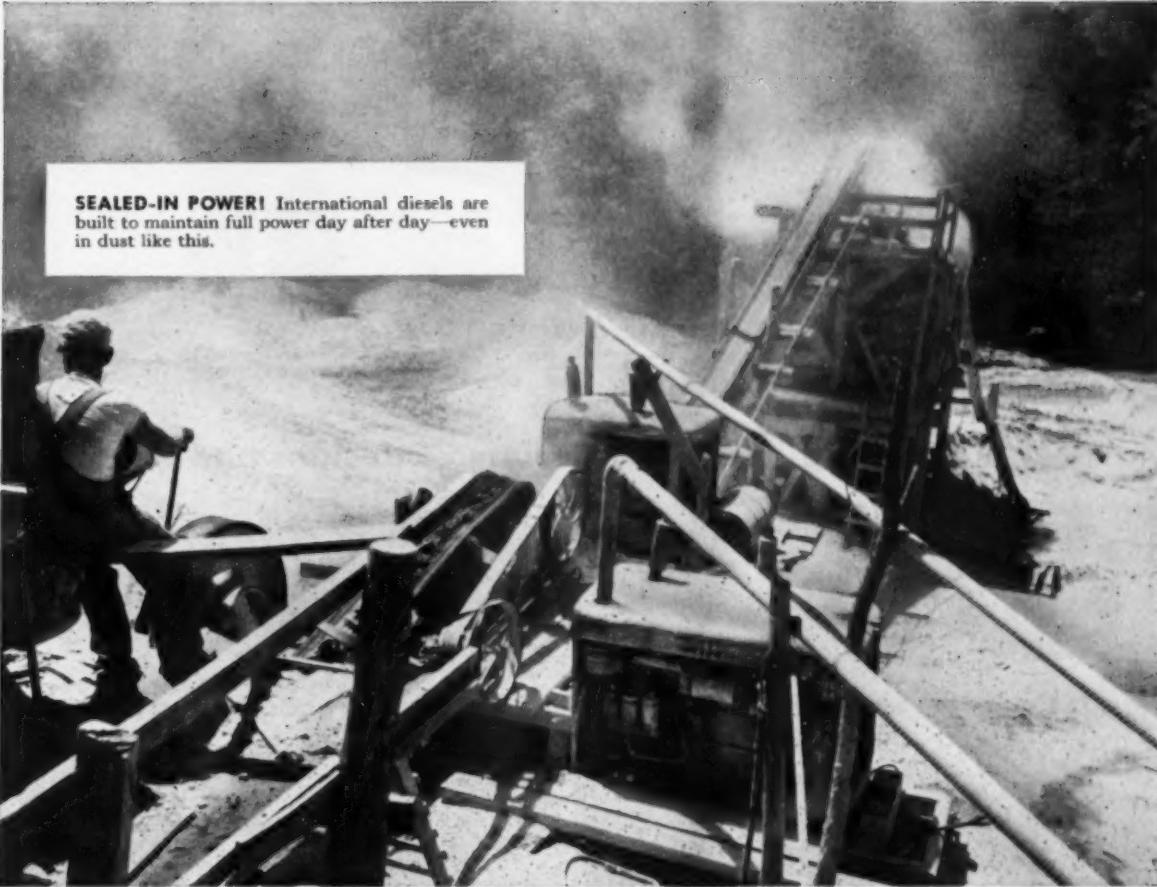
Our engineers, who work with you in determining the best rings for your applications, have all the facilities of the large, modern Koppers piston ring plant at their disposal . . . to supply you with rings that cut down-time, increase efficiency and lengthen the life of your equipment.

WRITE, wire or phone us today for experienced help with your piston ring problems. **KOPPERS COMPANY, INC., Piston Ring Dept., 1588 Hamburg St., Baltimore 3, Md.** *Van der Horst Process



Koppers American Hammered Industrial Piston Rings

Only KOPPERS can furnish K-Spun® and Porous Chrome!



SEALED-IN POWER! International diesels are built to maintain full power day after day—even in dust like this.

"TURNS ROCK TO DUST IN ONE OPERATION"

Hamilton Lime Company, Paris,
Missouri, Really Knows Value of
"Power That Pays!"

A tough combination—an International UD-18 and a UD-24 in a double hook-up—smash out thousands of tons of agricultural lime and road rock every year for Charles Hamilton.

Owner Hamilton knows how much Internationals do for him. He says:

"It really takes power to turn solid rock into dust in one operation. These two Internationals turn out 300 tons of limestone dust in 10 hours and run smooth all the time. Here at the quarry an engine gets put thru the rough dust treatment. Years of good service proved our Internationals can take it."

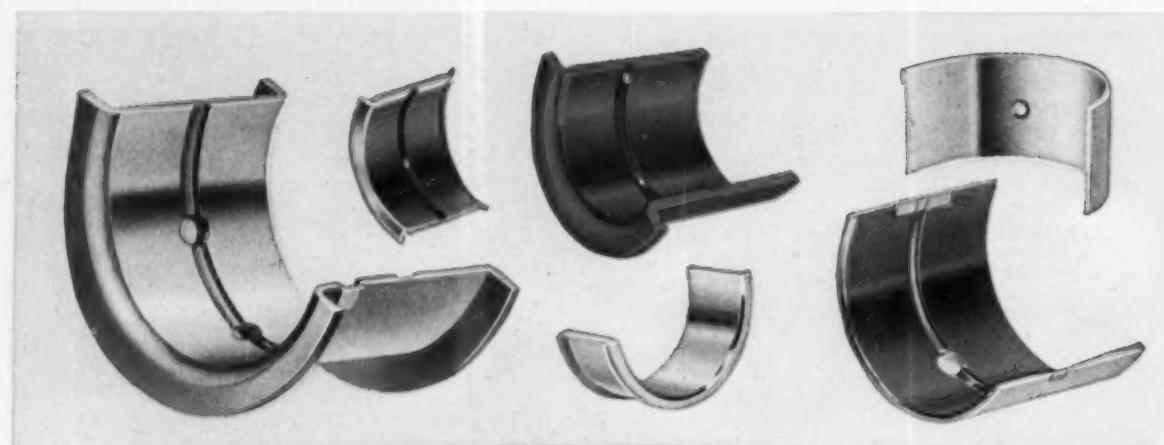
Internationals that can do a good job like this can do a good job for you. See your International Industrial Distributor. See International power on the job. Get the facts on "Power that Pays!"

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILL.



INTERNATIONAL

POWER THAT PAYS



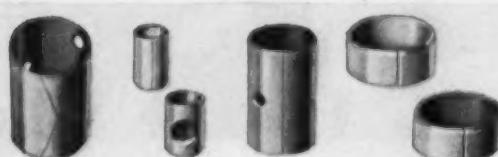
Sleeve bearings in a wide variety of designs and sizes



Cast bronze bushings



Precision bronze parts



Bi-metal split bushings



Rolled split bushings



Washers



Spacer tubes

**research • engineering
quality control**

FEDERAL-MOGUL CORPORATION



11039 Shoemaker, DETROIT 13, MICH.

Since

1889

FEDERAL-MOGUL



Designed by Tams, Inc. and built by Jakobson Shipyard, Oyster Bay, L.I., the CORDELIA is powered by a General Motors Model 16-278A Diesel engine.

New Haven Chooses GM Diesel-Electric Drive

The CORDELIA is the first General Motors Diesel-Electric Drive tug delivered to The New York, New Haven & Hartford Railroad in its fleet modernization program. This new tug will ferry two car floats, each carrying 20 freight cars, between Jersey City and Oak Point Float Bridge Terminal, bucking the strong Hell Gate currents in the East River.

Where close schedules have to be maintained, General Motors economical, dependable and efficient Diesel-Electric Drive is the first choice today.

CLEVELAND DIESEL ENGINE DIVISION

GENERAL MOTORS • CLEVELAND II, OHIO

ENGINES FROM 150 TO 3250 H.P.



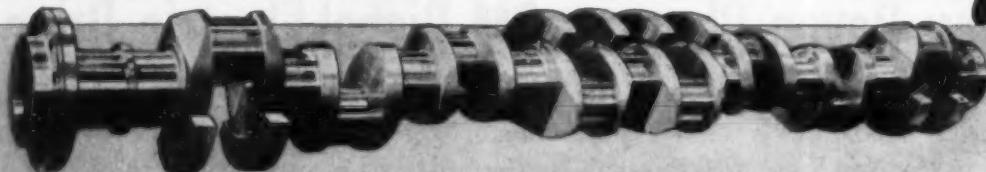
Tie up to GM Service



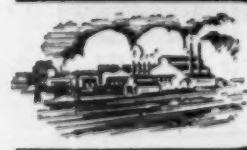
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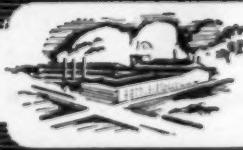
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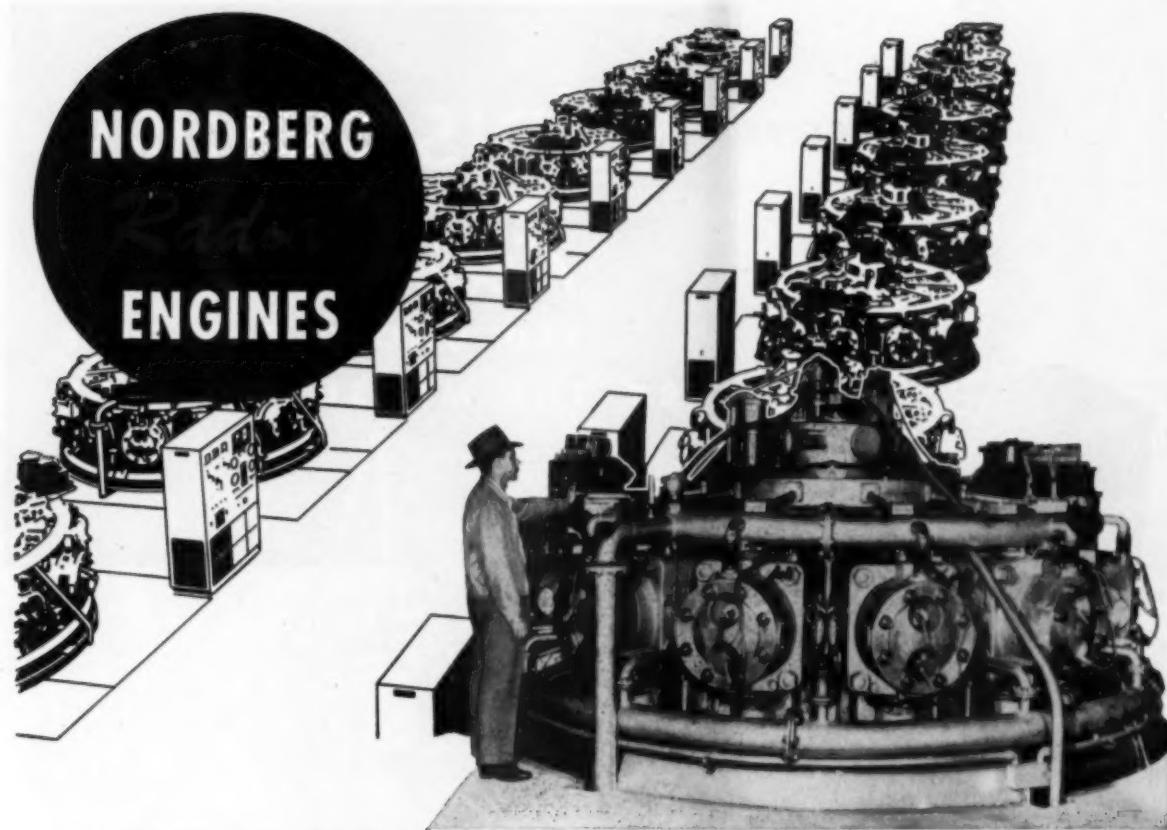


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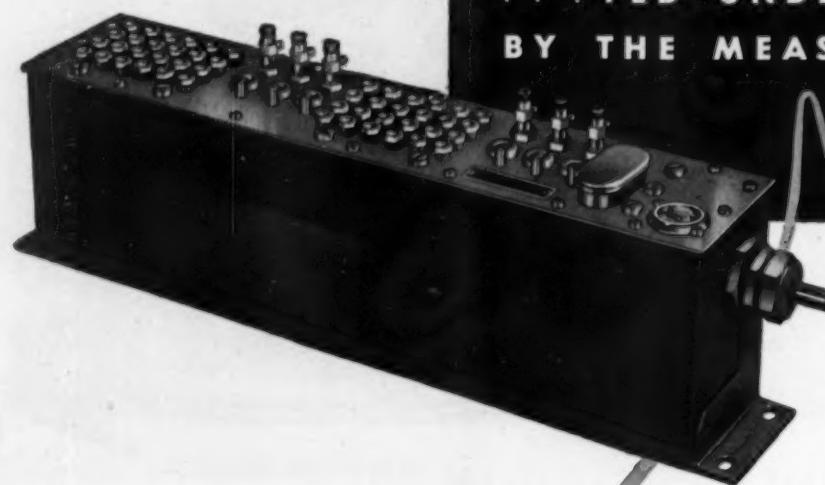


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This lubricator becomes an integral part of a machine tool in which there are 48 vital bearings that require dependable lubrication. The Madison-Kipp mechanism is so compact that the reservoir measurements are only 4" wide, 19 $\frac{3}{4}$ " long by 5 $\frac{1}{4}$ high."

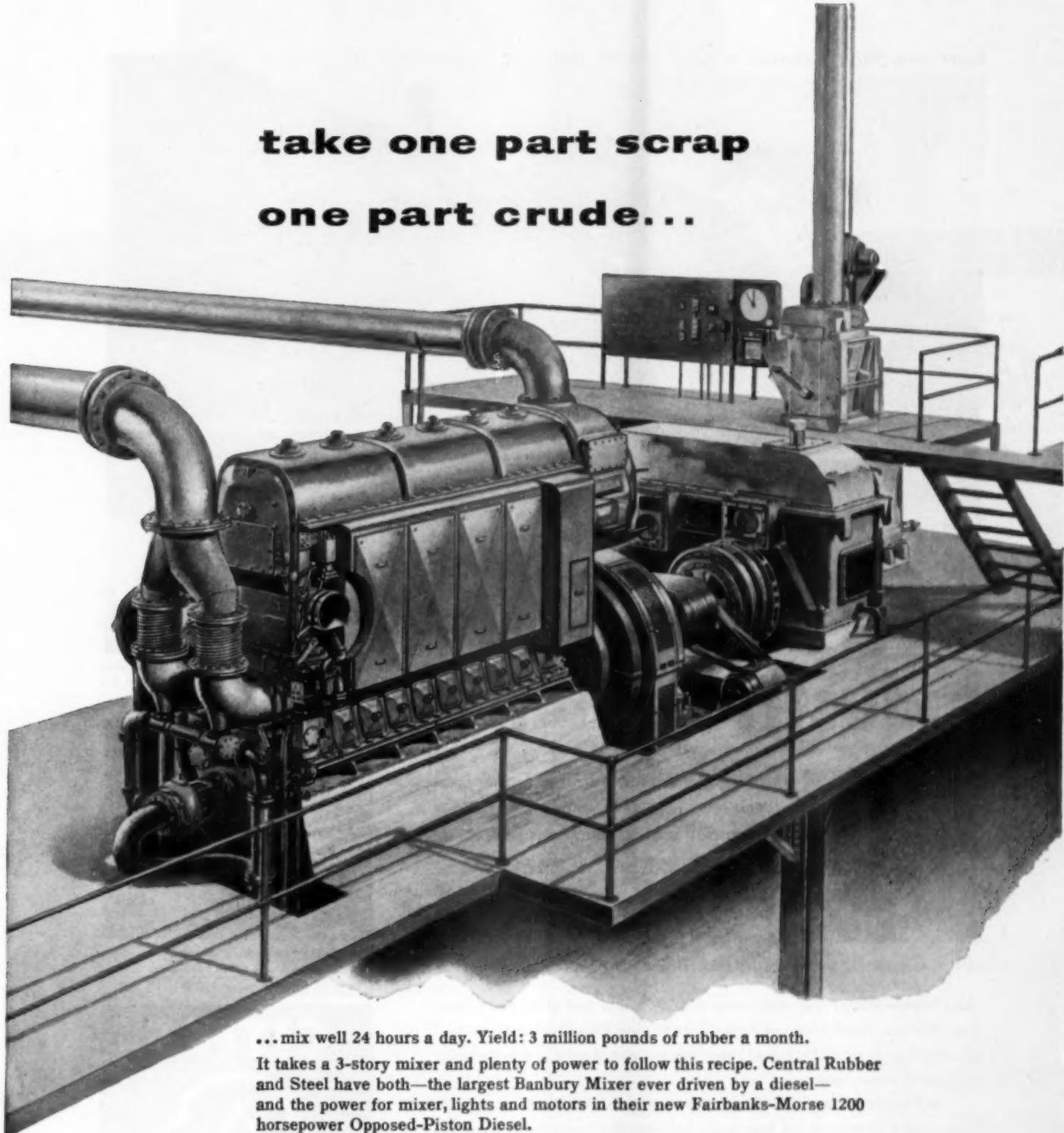
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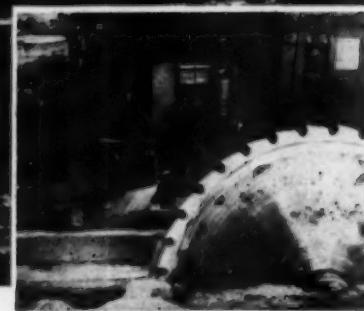


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a name worth remembering when you want the best

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EARLY 19TH CENTURY SAWMILL IN EAST TOPSHAM, VERMONT.



100-HORSE DIESEL, powered and lubricated with Cities Service Products, is the power plant for Miller's operation.

Industrial Giant?



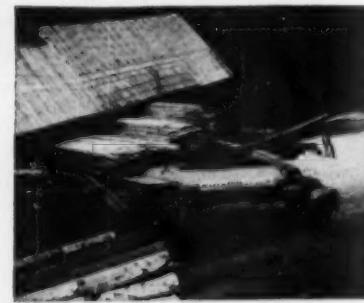
No, Duncan Miller, Vermont logger (pictured left), is no industrial giant, but his power and lubrication needs are just as vital, and served just as assiduously by Cities Service. Cities Service is proud of its long and successful record serving America's top industrial organizations, but it is equally proud of its record with the "Duncan Millers."

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FOR SEVEN YEARS, Miller has used only Cities Service Products and "They have given best results at all times."



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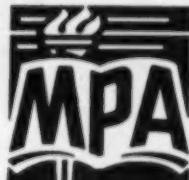


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FRONT COVER ILLUSTRATION

The new diesel ferry *Kahloke* now operating from Vancouver to Nanaimo. See article beginning on page 40, this issue.



EXPANSION-CONTRACTION-VIBRATION...

Here are 3 Ways to Cure Them!

These are the right connections—wherever there's unwanted motion—or critical temperature, pressure, vacuum or corrosive action.



TITEFLEX®
All-Metal
Flexible Hose

stands up to conditions that would ruin rigid tubing. You can use it for scores of ticklish jobs... Connect misaligned or moving parts of machinery. Absorb vibration, or pulsation. Transmit vacuums, shield wires and cables against electrical or electronic interference. Handle difficult gases, vapors or liquids—from ammonia to acid to sea-water to steam. There's more than one application in your plant right now that needs TITEFLEX.

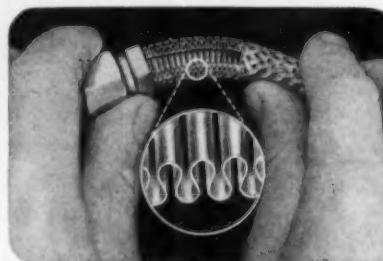


Sectional view shows rugged, flexible, seamed construction of Titeflex.

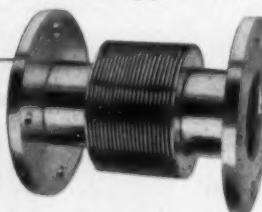


UNIFLEX
Helically-Corrugated
Seamless Flexible Tube

is tough, corrosion-resistant, leakproof. Use it in applications too tough for ordinary concentric tubing. For example, oil burners, hydraulic lines, air conditioning equipment, refrigeration machinery, pumps, compressors, diesels and machine tools. Metal-to-metal seat of UNIFLEX fittings assures leakless service. Helical, seamless wall structure gives it greater flexibility and longer life. Thoroughly tested in service, UNIFLEX offers real advantages where conventional tubing gives trouble.



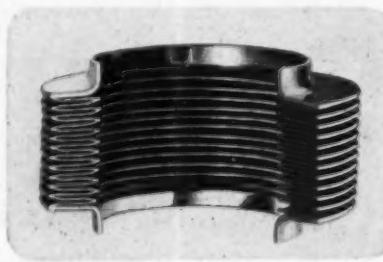
Note the helically-corrugated, seamless wall structure of Uniflex.



TITEFLEX BELLows

have unique, welded, convoluted-diaphragm construction. They absorb linear movement in many types of equipment—without weakening lines and without reducing the flow rates of gases

or liquids being conveyed. Use TITEFLEX Bellows to accommodate linear contraction and expansion or high frequency vibration, to seal high pressure valves and shafts, or to handle gases and corrosive liquids at high temperatures. For special applications, special designs can be furnished. Complete bellows assemblies can be supplied with any required types of fittings.



Cross-section shows the welded, convoluted-diaphragm construction of Titeflex Bellows.

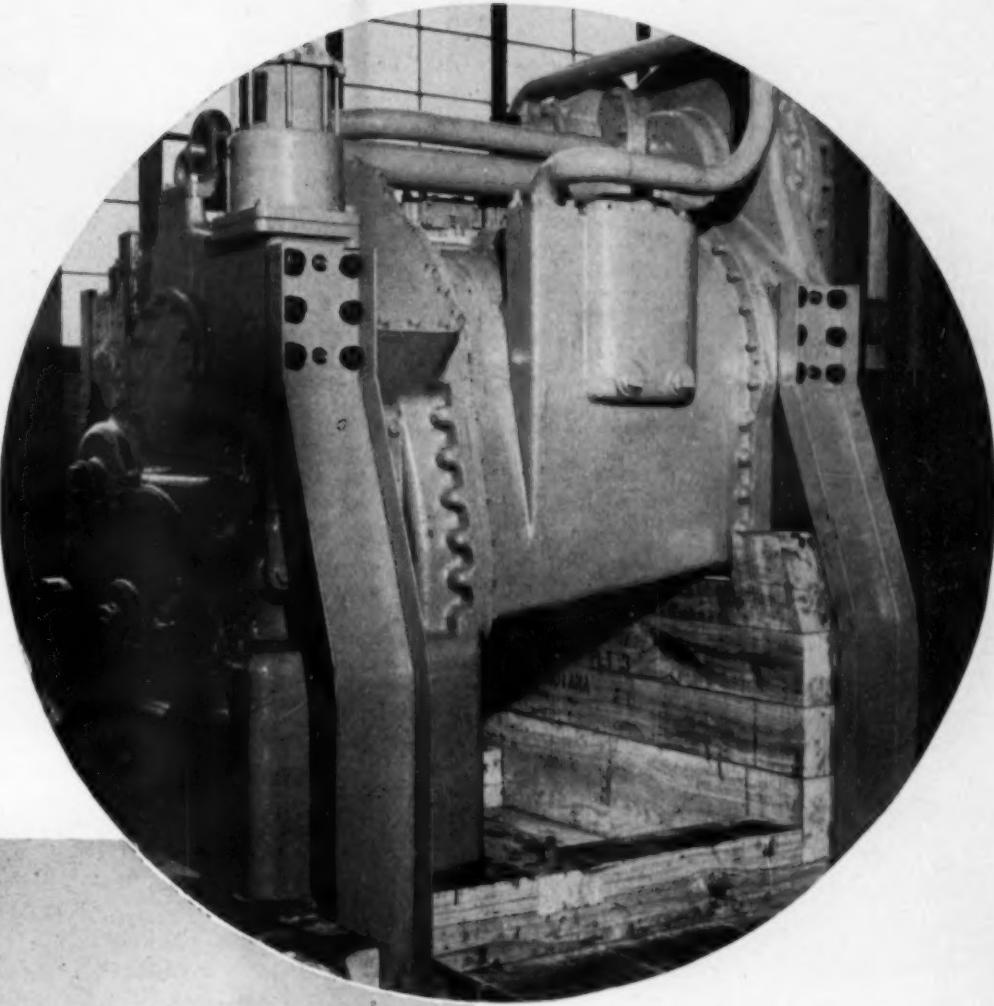


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HYDRAULIC DRIVE SWITCHING LOCOMOTIVE

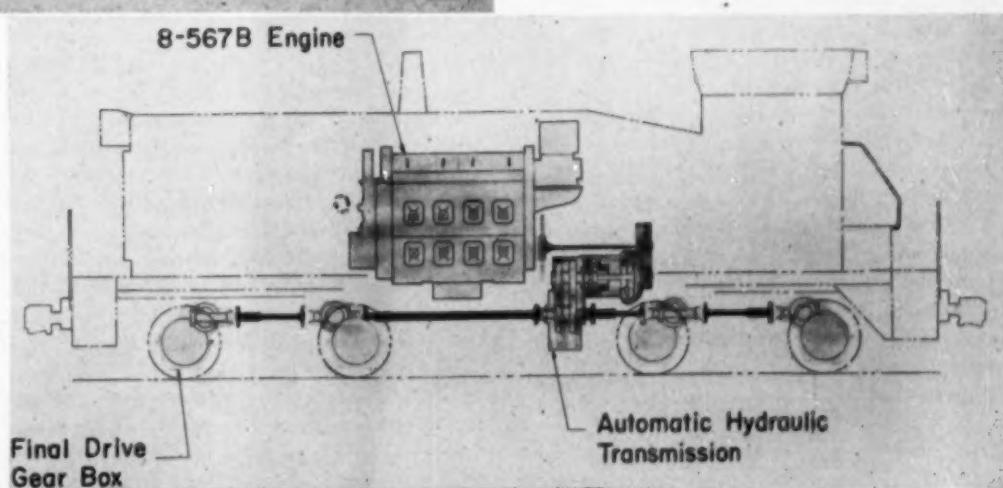
THE most powerful application to date of an automatic transmission in a moving vehicle in the United States was disclosed at Atlantic City, New Jersey, as part of the exhibit of the Electro-Motive Division of General Motors at the Quinquennial convention of the Railway Supply Manufacturers Association, June 22-27. The newest application is in a development project, the new 800 horsepower General Motors Diesel hydraulic drive switching locomotive. The transmission is an Allison Torque converter, just developed by Allison Division of General Motors for use in standard as well as narrow gauge railroad locomotives. The torque converter is supplemented by a three-speed automatic shift.



▲ 800 hp. Allison torque converter which is used in the new development project General Motors' 800 hp. hydraulic drive diesel switching locomotive recently started on tests by Electro-Motive Division of GM.

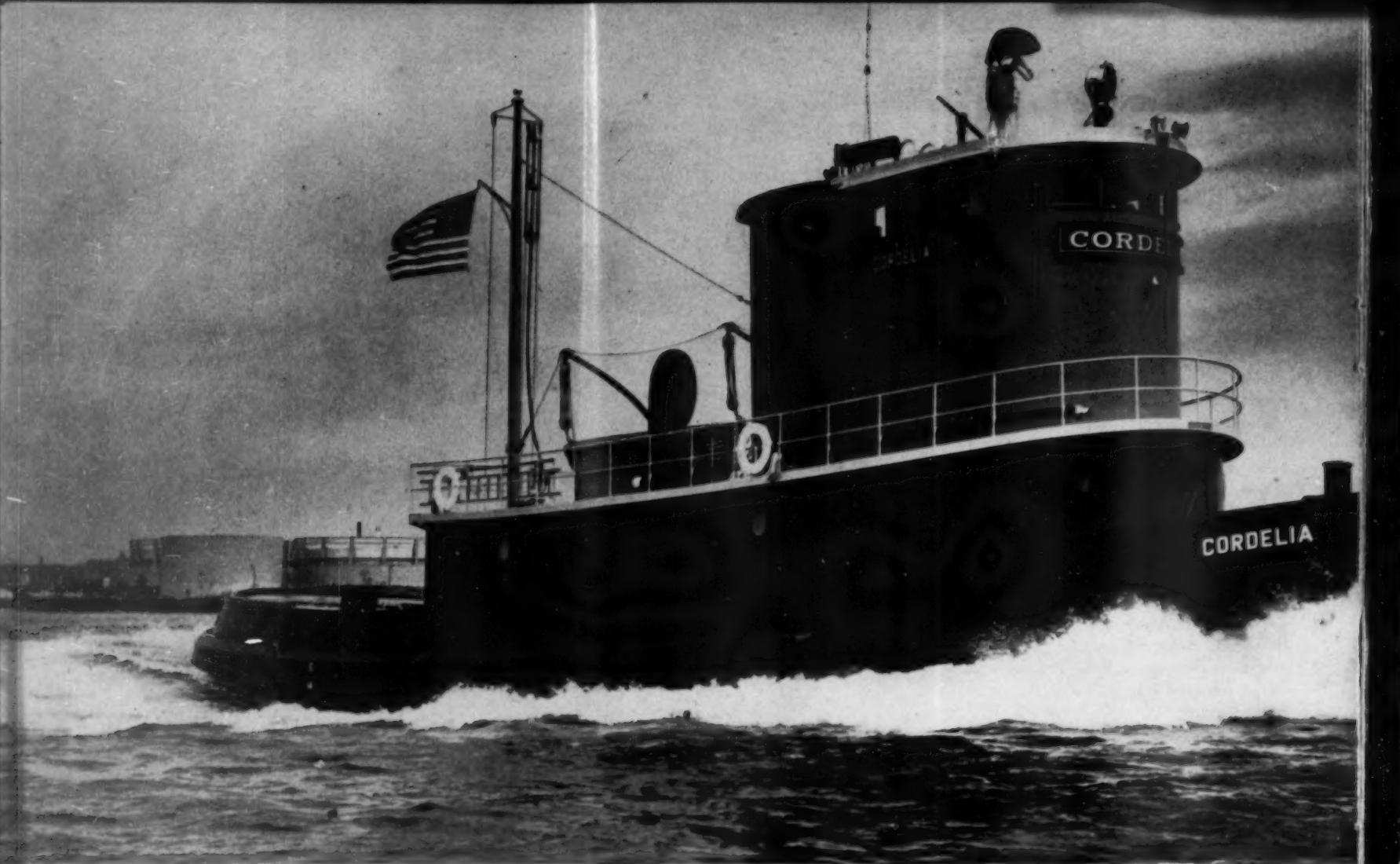
◀ The newest and most powerful application of the automatic transmission principle in moving vehicles in the United States. The 800 hp. GM diesel switching locomotive, the new Allison torque converter transmission for standard gauge regular railroad service.

◀ Schematic diagram of power transmission for development project diesel hydraulic switcher of EMD.



The switching locomotive has a maximum full load speed of 40 miles per hour and a continuous tractive effort of 57,500 pounds at 2.6 miles per hour. One of the 800 horsepower Allison torque converters is on display in the General Motors Permanent Exhibit at Steel Pier with earlier automatic transmissions developed by other General Motors Divisions for automotive uses.

Also included in the exhibit at Steel Pier was a \$50,000 12-foot scale model of a standard General Motors E8 Diesel electric passenger locomotive unit, cut away to show all of the locomotive parts in accurate detail.



RAILROAD TUG "CORDELIA"

**Cordelia Is First of 8 GM Powered Boats to Move
New York, New Haven & Hartford Freight
Across Port of New York Waters**

By DOUGLAS SHEARING

THE *Cordelia*, first of an entire new fleet of diesel-electric tugboats, has been put into service in New York Harbor by the New York, New Haven & Hartford Railroad. When the new fleet is completed, eight General Motors dieselized tugs will replace the ten steam vessels which now move the railroad's freight across the waters of the Port of New York. Purpose of the conversion, according to railroad officials, is to provide the best possible equipment for the vital job of linking New England's rail arteries with national rail systems terminating in New Jersey. The greater power, efficiency and dependability of the new tugs will help to insure rigid adherence to the railroad's freight delivery schedules.

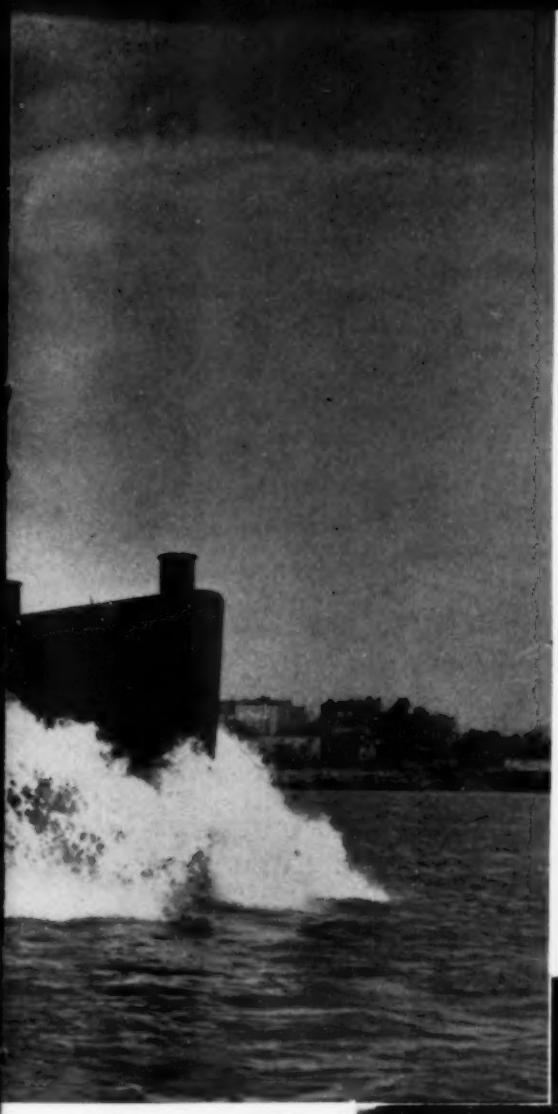
This marine operation is unusually arduous and demanding. The railroad regards the movement of

freight cars on car floats as an extension of rails across the water and the tugs must keep the cars moving on regular railroad schedules 24 hours a day, every day of the year. Winds, storms, ice and tides cannot be allowed to disrupt the timetable since schedules are timed to meet demands of perishable freight shipment to Boston and other New England cities. Trains moving to New England from the South and West are broken up at Jersey City and Greenville, N.J., and cars are loaded on floats which carry as many as 20 cars. The tug handles two car floats, a total deadweight load of more than 4,000 tons. Two routes are used: from Greenville across the Upper Bay to Bay Ridge, Brooklyn, and then via the tracks of the New York Connecting Railroad over the Hell Gate Bridge; and from Jersey City across the harbor, up the East River through Hell Gate to Oak Point terminal in

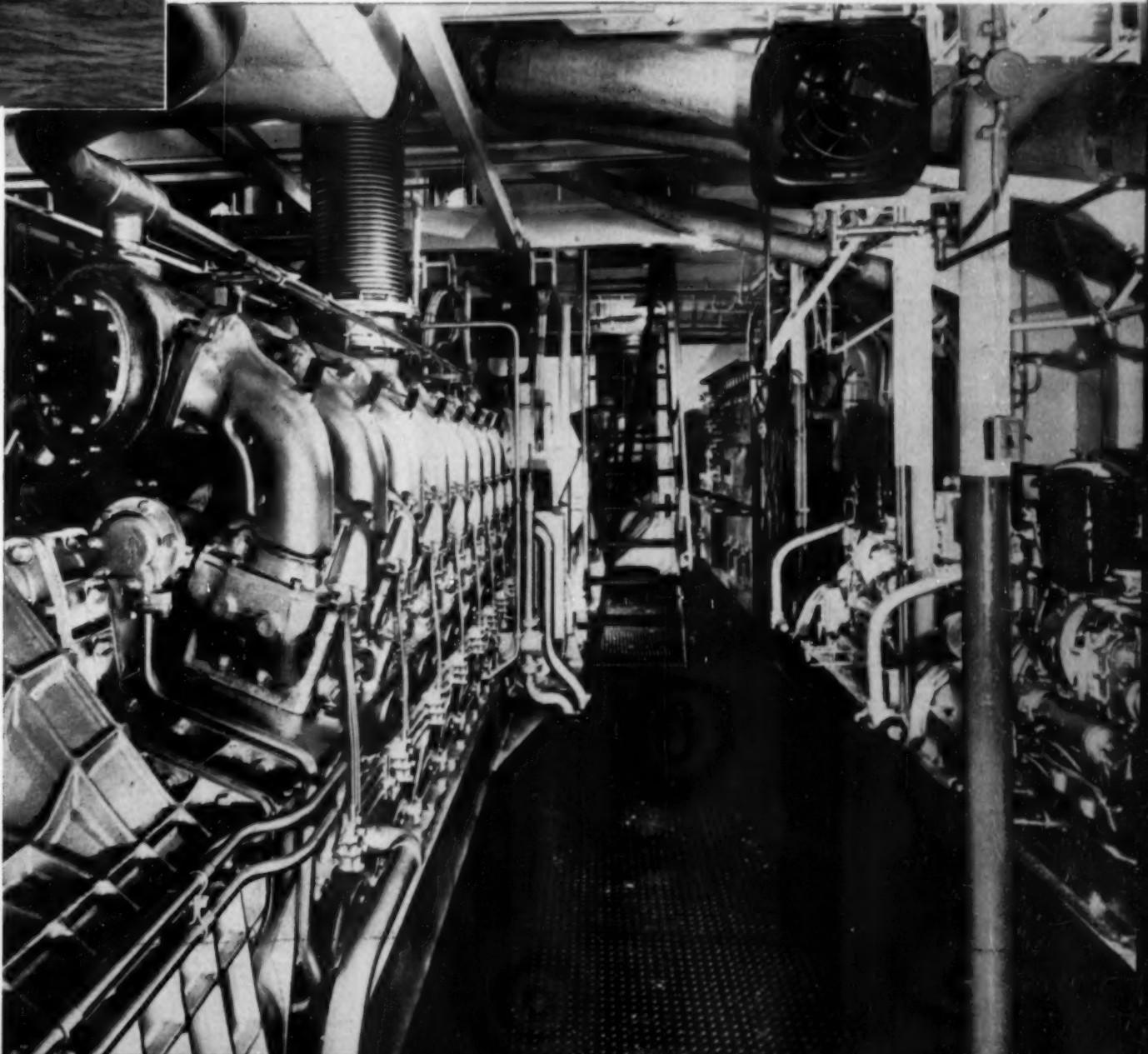
the Bronx. The return run carries the products of industrial New England to the rest of the nation.

The Bay Ridge-Greenville run of $3\frac{1}{2}$ miles is scheduled at 25 minutes in either direction fully loaded. The Oak Point-Jersey City run measures 12 miles and is scheduled at 1 hour, 30 minutes fully loaded in either direction in spite of the racing Hell Gate tide which creates probably the worst conditions in the world for this kind of service. In an average month, the tug handles more than 40,000 cars on these regular runs. In addition, 1,000 cars a month are moved by the tugs on scows, covered barges and hoist boats to and from ships in the harbor.

To meet the specific requirements of this exacting service, the *Cordelia* was designed by Tams, Inc.,



The diesel tug *Cordelia*, powered by a 1590 hp. GM diesel, is the first of a new fleet that will handle all Port of New York freight movement for the New York, New Haven & Hartford Railroad.

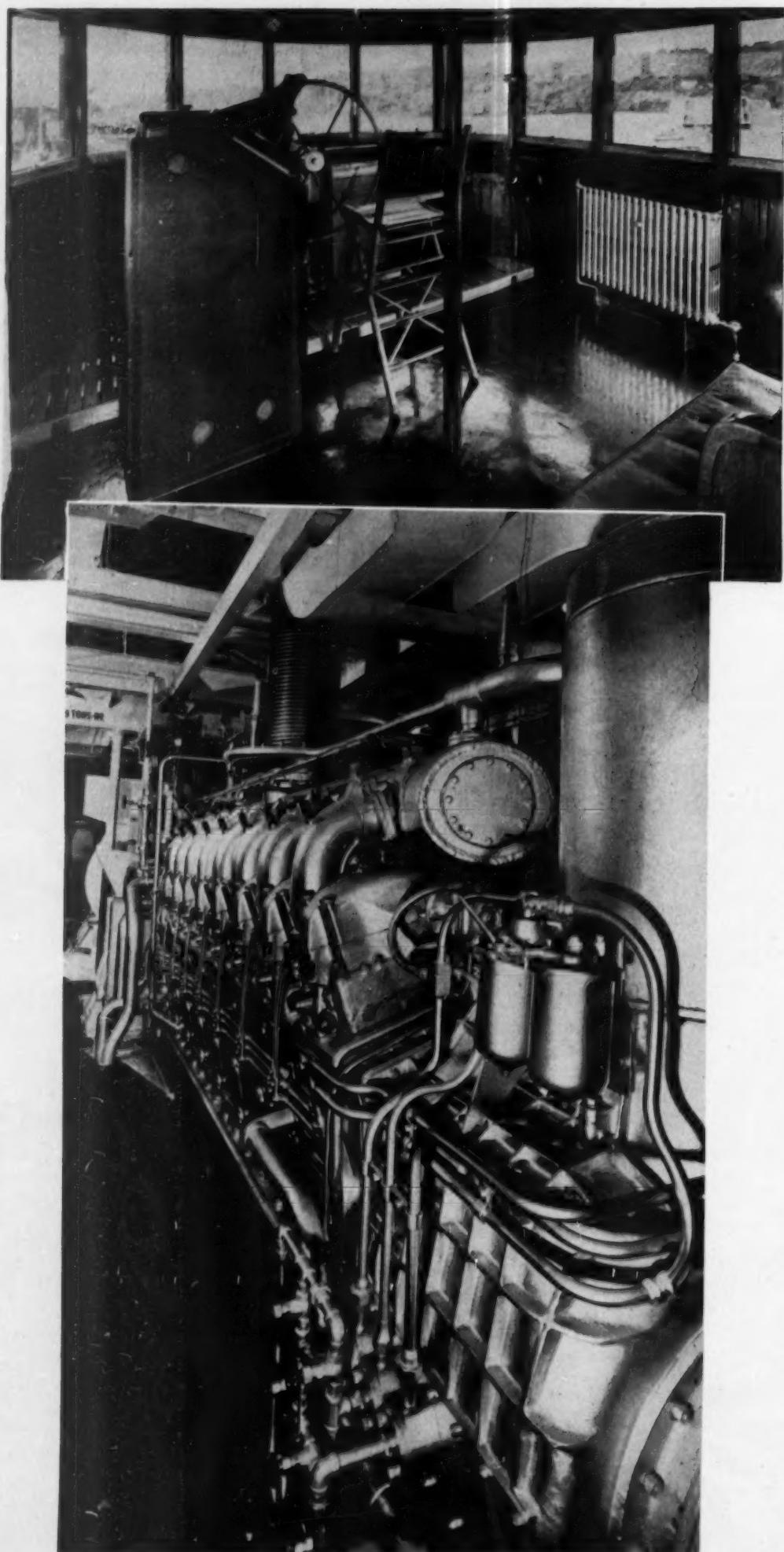


General view of the *Cordelia*'s engine room showing the 1590 hp. GM Cleveland propulsion engine with Marquette governor at left and two 30 kw. GM auxiliary diesel-generator sets at right. The *Cordelia* is equipped with a Briggs lube oil clarifier.

New York naval architects, in consultation with the railroad's marine department. The vessel was built at the Jakobson Shipyard, Oyster Bay, New York. The *Cordelia* has a length overall of 106 ft., beam molded of 26 ft. and depth at side amidship of 14 ft. The modern railroad tug requires great structural strength to withstand the squeeze of two 2,000-ton car floats towed alongside. On the *Cordelia*, every third frame is a web frame tied at the top with steel girders to achieve tremendous side strength. Heavy guards are built out of the hull as blisters with $\frac{3}{4}$ in. guard plate supported by three rows of heavy steel channels. The guards form a long, relatively flat bearing surface to work against the floats. Sheer has been reduced to eliminate the tendency of a tug to override the tow, to allow convenient crew movement from tug to float, and to permit tow lines to lead in as near a horizontal plane as possible.

Controlled power and maneuverability are related requisites for a tugboat operating in the heavy traffic and changing currents of New York Harbor and particularly in the swift flow through Hell Gate. Propulsion engine of the *Cordelia* is a General Motors Cleveland Diesel Engine Division Model 16-278A diesel, a 16-cylinder, 2-cycle engine rated at 1590 hp. at 750 rpm. The diesel drives directly a 1090 kw., 525 volt direct-current generator which supplies power to a 1380 hp. propulsion motor. The lube oil clarifier is Briggs. The propulsion motor develops rated power at 600 to 750 rpm. and turns the propeller at 144 to 180 rpm. through reduction gears. Within this speed range, the propeller has a full 1350 shaft horsepower.

With this diesel-electric drive, maximum power is available under all operating conditions. The propulsion engine does not stall even when the propeller is stopped or reversed. The captain in the pilot house has full and instantaneous control of power and direction. It was demonstrated on the tug's trial run that it was possible while running at full speed to swing the rudder 100 degrees from hard over to hard over in 11 seconds. The time for a crash stop from full speed ahead to dead in the water was just 24 seconds. Railroad operating officials reported that with steam tugs it is necessary to back and fill in order to get out of a slip. With the diesel-electric tug, however, it is possible to put the rudder hard over, apply full power and actually turn the boat in its own length. The combination of strong, readily-available power, large propeller and deep draft assures the tug's full control of heavy tows. The hull is fined down so that a minimum of ballast is required to bring the vessel down to the desired water line. Ballast tanks are filled with water to compensate for consumption of fuel



The pilot house is set high for good visibility and is well equipped with the latest navigational aids.

and the boat stays within 12 in. of the original water line at all times.

With the steam tugs, refueling has been necessary every third day. The *Cordelia*, however, has six fuel tanks with a total capacity of 80,500 gallons which will permit continuous operation without refueling for a full month. The larger fuel capacity and lesser maintenance requirements of the diesels are expected to result in greater availability of the new tugs so that eight vessels will be able easily to do the work of ten steam tugs of which only eight are available for service at any one time. To insure continuous, trouble-free service, the heavy-duty diesel is equipped with protective accessory equipment. Fuel oil is passed through a filter and a pair of strainers before it reaches the injection pumps. Fresh water is circulated through engine jacket and cooled in a heat exchanger. Automatic thermostatic valves keep lube and water temperatures at desired levels. A complete alarm system warns of any incipient malfunction. There are two identical auxiliary generator sets with 45 hp. General Motors Model 3064B, 3-71 Detroit Diesels driving GM Delco generators at 1200 rpm. The big propulsion engine is started by compressed air while the auxiliary engines utilize battery-powered electric starters.

The *Cordelia* is specially well equipped with control and communication equipment and navigational aids. The captain has available to him communication system which permits instant contact with the dispatcher ashore, and an elaborate public address system. Believed to be the first railroad tug so equipped, the *Cordelia's* PA system has seven loud speakers, two forward of the pilot house, two just aft of the pilot house, two way aft and one in the galley. By this means, the captain can tell members of the crew what he plans to do and order them to proper stations. Since the system has a range of 200 ft., he also can talk to men aboard the tugs or to men on shore as he moves into a slip. The pilot house itself is set high to insure good visibility and control.

The well-equipped railroad tug is in effect a fire-boat since it may be called on to fight fires on such railroad property as piers, warehouses, car floats, barges or the like. The *Cordelia* has a powerful fire monitor served by a motor-driven fire pump. The bilge pump, of course, can also be used in fighting fires. It is a work boat, intended for 24-hour service, but no sleeping accommodations need be provided for the crew. The crews can be shifted every eight hours without loss of operating time. Provision is made for clothes lockers, shower rooms, a well-equipped galley and spacious mess. In addition to the eight new welded steel diesel-electric tugs, the railroad's marine improvement program will include replacement of remaining wooden car floats with new steel floats. This will permit full utilization of the speed and power potential of the tugs.

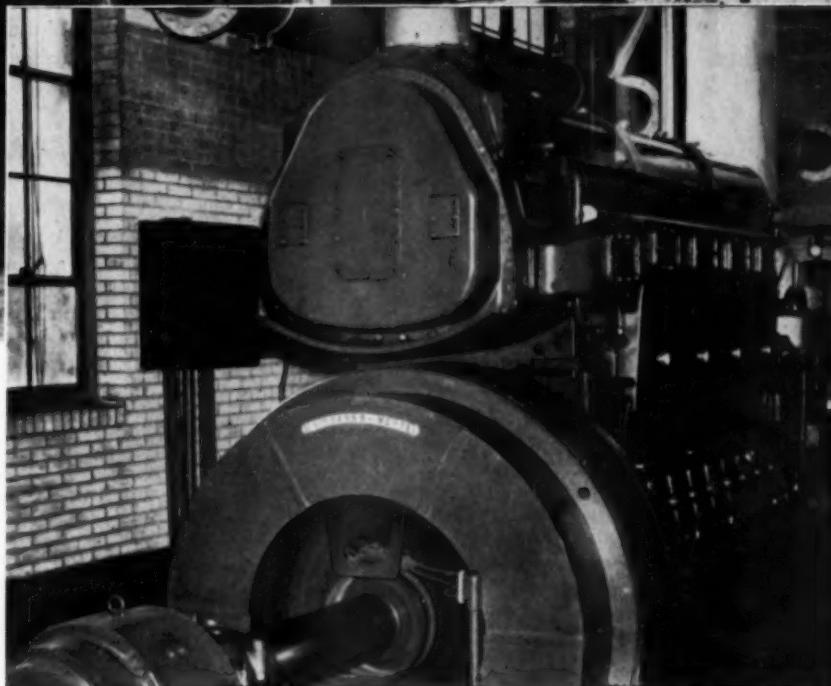
The propulsion engine of the *Cordelia* is this 2-cycle, 16-cylinder, Model 16-278A GM Cleveland Division diesel rated at 1590 hp. at 750 rpm. This view is from blower end.

HOWARD UNIVERSITY'S POWER PLANT

by V. Henry Warrick



Howard University's campus covers 55 acres and includes 32 buildings. One of the more impressive structures is Founders Library.



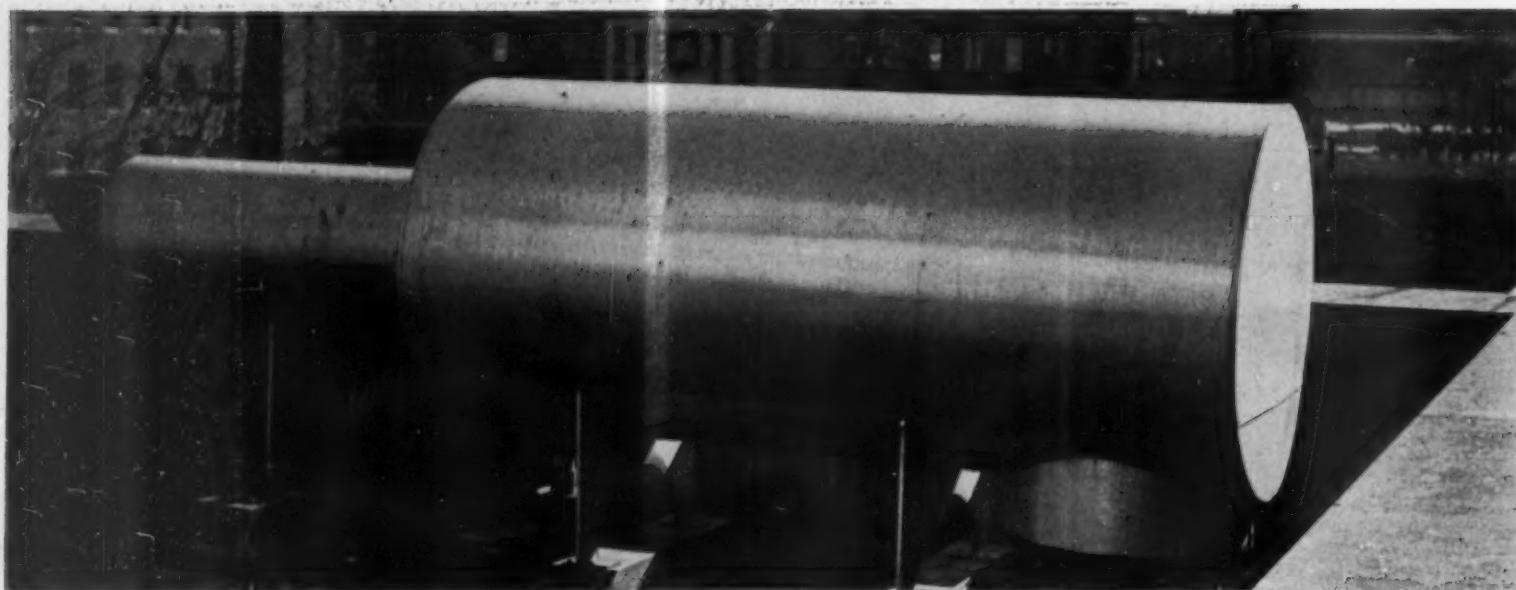
Howard's diesel is an 8-cylinder, 8½ by 10-in. opposed piston, Fairbanks-Morse rated at 1280 hp. at 720 rpm. It drives an 862 kw. F-M generator.



FACED with the heat balance problem so common to power plants making steam for process and heating purposes, Howard University of Washington, D.C., has brought its system into balance with the installation of a new 862 kw. Fairbanks-Morse diesel generator unit. Designed to carry the major portion of the summertime electrical loads, the diesel generator has been instrumental in reducing per-kilowatt costs by over 60 percent in the light steam loads and by 7 percent on a yearly basis. The plant supplies power as well as heating and process steam not only to Howard University but also to Freedmen's Hospital, located directly across the street from the power plant.

Howard University is one of the nation's larger Negro universities and is located on a high point of land in the Northwest section of Washington, D.C., about three miles from the Capitol. Covering fifty-five acres, the campus is extremely beautiful and the thirty-two buildings that now dot it are only part of a total of more than fifty contemplated under the present \$17,000,000 building program. More than five thousand students from all over the world attend Howard. A school open to students of all races, Howard offers in its ten schools and colleges courses leading to degrees in liberal arts, engineering, law, social work, religion, dentistry, pharmacy, medicine, and music.

The power plant cornerstone was laid in 1934, and the plant was first put into service in 1936. Originally, the Freedmen's Hospital plant supplied power and heating steam to the two institutions but early in the 30's the growth of the University made it apparent to the officials of both organizations that a new plant would be necessary. Load studies were undertaken and two oil-fired boilers were installed, each with a capacity of 45,000 lb. hr., at 200 psig. Power generation equipment consisted of an Ames Unaflow engine driving a 250 k.w., 240/120 volt d.c. generator and two turbine-driven 4000-volt a.c. generators with a rating of 500 kw. each.



Diesel exhaust gases vent through this horizontal Maxim silencer.

TABLE I
April, May, June

	1950	1951	%
	Without Diesel	With Diesel	Change
Total power plant cost.....	\$56,966.10	\$43,899.20	22.9 -
Unit steam cost—cents per 1,000 lb.....	\$ 117.234	93.499	20.3 -
Unit electric cost, cts. per kwhr.....	3.120	1.226	60.7 -
Fuel oil consumption gal.....	539,466	412,236	23.6 -
Fuel oil cost.....	\$28,587.35	23,968.90	15.6 -
Average fuel oil cost cts. per gal.....	5.25	5.86	11.6 +
Fuel oil consumption (diesel) gal.....	.....	58,301	....
Fuel oil cost (diesel) .....	.....	5,279.91	....
Average fuel oil cost (diesel) cts. per gal.....	.....	9.67	....
Total fuel oil cost.....	\$28,387.35	29,248.81	3.0 +
Total steam generation, 1000#.....	53,990	45,889	15.0 -
Station steam sendout, 1000#.....	32,804	37,836	15.3 +
Diesel electric generation, kwhr.....	.....	559,700	....
Total electric generation, kwhr.....	996,610	1,068,075	7.2 +
Station electric sendout, kwhr.....	846,080	886,135	4.7 +
% Diesel generation .....	.....	52.4	....
Hours diesel in service.....	.....	1,781	....
% of total hours.....	.....	81.5	....

A new two-panel Westinghouse switchboard was added to the plant's equipment to serve the diesel.

Just prior to the completion of the power plant, the new utility distribution system was completed. This system consists of a 7 by 5 ft. concrete tunnel which houses the steam mains, condensate return lines and the high- and low-tension electrical cables. More than large enough for a man to walk through, the tunnel speeds the locating of steam main leaks and cable faults and saves expensive and time-consuming digging when repairs become necessary.

Smaller branches of the main tunnel lead to each of the buildings on the campus. Because of the increase in loads as a result of postwar expansion, and to bring about heat balance in the summer months, it was decided to install a modern diesel-electric generator. This took the form of a Fairbanks-Morse 1280-hp. engine coupled to an 862 kw. generator. The installation of this unit in 1950 increased the total installed generating capacity of the plant by 70 percent and increased the ac. generating capacity by 86 percent.

The diesel is an 8-cylinder, opposed-piston engine of 8 1/8 in. bore and 10-in. stroke developing its rated 1280 hp. at 720 rpm. During the same year (1950), an award was made for the installation of a new stoker-fired boiler. A coal-burning unit was selected so that base load could be carried by either the coal-fired or the oil-fired boiler depending upon the relative price and availability of each fuel. Also in 1951, a new turbine-driven feedwater pump was installed as well as automatic frequency controlling, recording, and indicating equipment, necessary for the proper operation of technical apparatus in the many laboratories. Because of the complete condensate return system, make-up is at the extremely low figure of 2 percent. Consequently, only a small zeolite water conditioning unit is required in addition to the deaerating feedwater heater.

Plant operating procedure depends upon the size of the heating and process steam loads. During the winter months, steam generation is at a maximum with the diesel being used only to handle peak electrical loads not accompanied by corresponding increases in steam loads. The turbo-generators exhaust steam at 5 lb. pressure for building and feed-

TABLE II
Fiscal Years July 1 through June 30

Item	Unit	1947-48	1948-49	1949-50	1950-51	1951-52
Unit steam cost.....	¢/100 lb.	91.273	93.084	76.391	83.224	89.295
Unit elec. cost.....	¢/kwhr.	1.673	1.776	1.648	1.613	01.537
Total steam generated.....	1,000 lb.	233,126	230,114	241,354	241,313	223,683
Station steam sent out.....	1,000 lb.	159,968	151,967	164,439	175,936	180,964
Total elec. generated.....	Kwh.	4,046,014	4,280,004	4,077,752	4,082,518	4,490,365
Diesel elec. generated.....	Kwh.	.....	.....	.....	777,250*	1,876,300
Station elec. sent out.....	Kwh.	3,593,342	3,738,981	3,521,813	3,442,648	3,860,615
Fuel oil consumption.....	Gal.	2,090,806	2,153,458	2,225,616	2,178,639	2,154,865
Fuel oil cost.....	\$	\$157,352.16	\$156,554.16	\$115,749.64	\$126,934.99	\$125,353.35
Average fuel oil cost.....	¢/ gal.	7.52	7.27	5.19	5.86	05.82
Fuel oil consumption (diesel).....	Gal.	.....	.....	9,825	61,548	206,414
Fuel oil cost (diesel).....	\$	.....	.....	\$ 869.94	\$ 3,793.19	\$ 20,917.93
Average fuel oil cost (diesel).....	¢/gal.	.....	.....	0.0885	0.0971	0.1013
Total Fuel Oil Cost.....		\$157,352.16	\$156,554.16	\$116,619.58	\$132,728.18	\$146,271.28
Total Operating Cost.....		206,164.82	208,037.23	183,663.59	201,944.32	223,219.02

*Diesel installed October 30, 1950.

water heating. Steam at 200 lb. pressure is also reduced to 125 lb. for use in plant auxiliary drives, hospital sterilization work and for boosting heating system pressure if necessary. In the summer months, when heating loads are at a minimum, the diesel unit carries the base load. It is during this time that the maximum savings accrue from the use of diesel power. Table I shows comparative figures for three light load months while Table II gives the overall yearly picture for the last five years.

Referring to Table I, it is interesting to note that although the cost of a gallon of fuel oil increased 11.6 percent from 1950 to 1951 while net steam output increased 15.3 percent and net power output was upped 4.7 percent, these increases were accompanied by an actual reduction of 23.6 percent in the gallons of fuel consumed and a reduction of 60.7 percent in the cost per kw. hr. Overall yearly savings are lower, of course, but Table II reflects the lower unit cost for electricity in spite of sharp increases in the price of diesel fuel. The steady increase in the total amount of diesel fuel consumed reflects the increasing use of this type of power generation even in periods of heavy steam demand.

Often the diesel is used at extremely light loads and though this is not conducive to engine efficiency, it serves the over-all purposes of plant balance and economy. The steam generation and output figures reflect greater efficiency in this phase of operation for, while steam demand increased over 15 percent, the total steam generated decreased by a like amount.

Much of the efficiency of the entire plant is due to a complete system of preventative maintenance. Each piece of equipment is card-indexed and specific overhaul intervals are established, based upon operating experience. Overhaul schedules reflect the use of the units, with the diesel, of course, being scheduled out of service in the winter and the steam generating units getting their checkups in the summer months. At the present time, enough generating capacity is available so that scheduling of outages is no problem. Planned increases in load will make scheduling of maintenance work more difficult unless more equipment is added.

All maintenance and repair work is done by the regular staff of the plant. Total personnel requirements are extremely low for a steam plant of this size, with only nineteen men being required for the 365 day per year operation. Personnel breakdown is as follows: (1) Chief Engineer (Nelson B. Shortt); (1) Assistant Chief Engineer (Jonathan L. Eugene); (5) Engineers, (1) Jr. Engineer (5) Boiler Operators; (4) Skilled Laborers; (2) Laborers. Occasionally the staff is supplemented by student engineers from the School of Engineering.

In the future, plant growth will parallel that of the university and operating techniques will attempt to keep pace so that efficiency can be maintained or improved. Present consumers of dc. power are in the process of being converted to ac. and the presently planned increases in load and capacity should materially reduce unit costs of operation.

From recorded experience with present equipment, it is clear that diesels will continue to play an important part in the Howard power system.

List of Equipment

Engines—One 1280-hp., 8-cylinder, 8 1/8 x 10 in. Model 38D8 1/8 diesel, 720 rpm. Fairbanks, Morse.

Generator—One 862-kw., 80% pf., 1077.5 kva. 4000/2300 volts, 3-phase, 60 cycle direct-connected generator. Fairbanks, Morse.

Governor—Woodward.

Fuel tank level gauge—Liquidometer.

Fuel filter—Nugent.

Lube oil—Sinclair Refining.

Auxiliary lube pump—Roper.

Oil cooler—Ross.

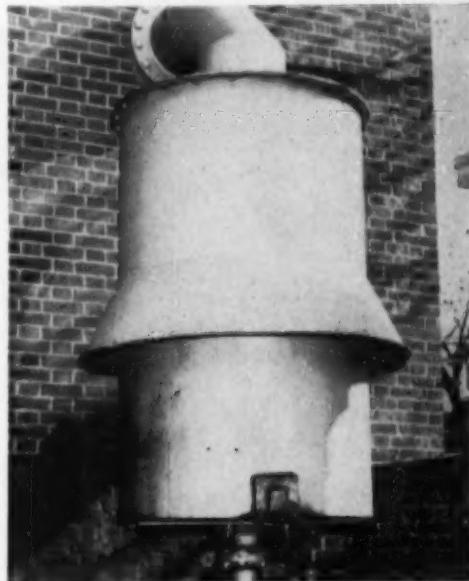
Silencer—Maxim.

Air filters—American Air Filter.

Switchgear—Westinghouse.

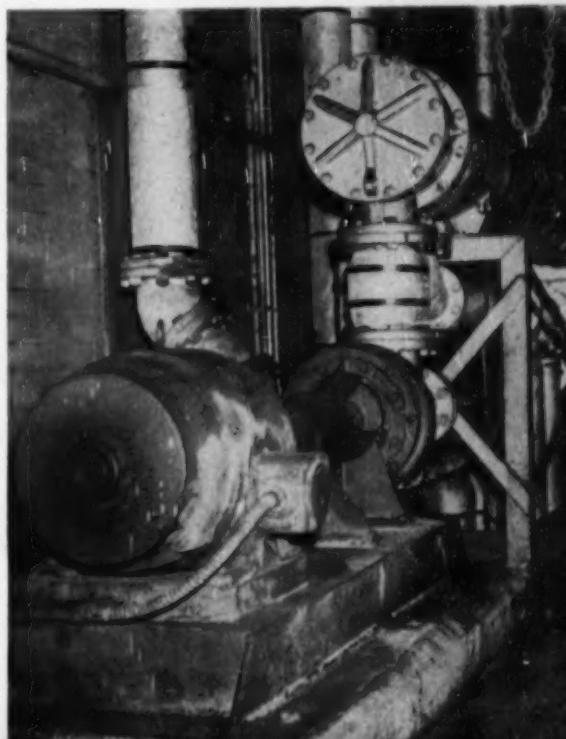
Pyrometer—Alnor.

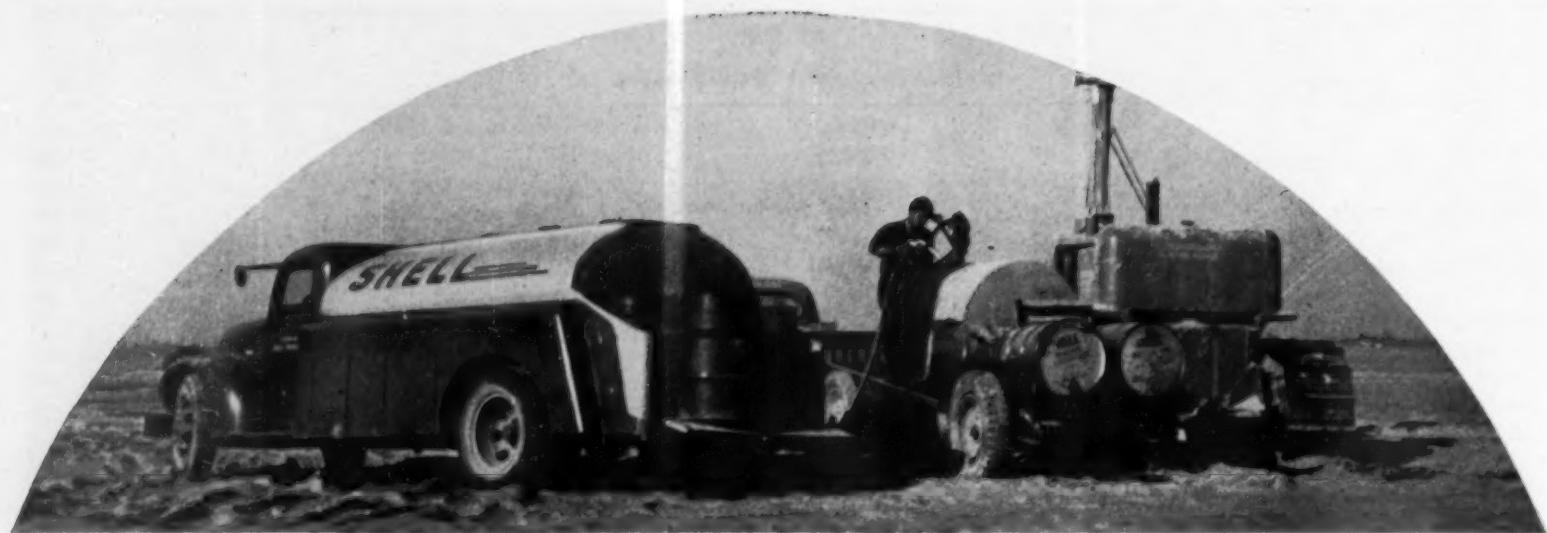
Pressure gauges—Marshalltown.



Air for the diesel is drawn through an American Cyclo filter.

This motor-driven centrifugal pump circulates cooling water through the diesel and an F-M evaporative cooler. Also shown is the Ross lube cooler.





Shell furnishes the fuel and grease to permit this Stockton custom land levelling specialist to wrest a square mile of desert from nature to the irrigated farm at a cost of about \$75 an acre. Goodall's service truck from Wasco, Calif. delivers to truck at side of GM powered Allis-Chalmers HD-20.

BIG SHELL GAME

**Kern County Distributor Covers 210 Accounts:
Delivery at Ranch for Land Leveling, Crop Flyers,
Seedbed Preparation Through Harvest of Cotton,
Grain, Alfalfa, etc.**

By F. HAL HIGGINS

EVER stop to give a thought to those bright red, yellow, blue, green and other colored drums, pumps and tank wagons you see everywhere over the modern U. S. mechanized map of towns, cities, ranches and plantations? Sure, you take them for granted just like free air, bread on the table and certainty of your next meal. That's a tribute to the Oil Industry. They are so efficient in their services they have won acceptance by the motorized public of this country. But your Old Reporter decided it was time to take a long look behind the western farm scene recently. He went to Bakersfield, Calif., to attend the 3-day Beltwide Cotton

Conference that had been scheduled for California, in order to allow cotton folks from the Old South to see how it is done on such a stupendously efficient basis. This literally is pulling the Cotton Belt off its old bed as the irrigated west and southwest increased acreage and mechanization by leaps and bounds since war's end in response to the continued demand for cotton at top prices.

An afternoon drive from Fresno to Bakersfield with side trips out into the fields where circling dehydration chemical spreading planes and colored dots of red, orange and green proved the mechanical

pickers were at work. These signs brought the visitors up against the fact that this world's top cotton farming system not only sits on top of oil fields, but literally swims in oil field products—over 200 of them from diesel fuel to "picker oil." This last product all picking machines must have in barrelful orders to keep going efficiently as the record crop is harvested, with over 5,000 picking machines at work in California this fall, over two-thirds of the crop will be so harvested at a big cut in cost over the slow hand picking. In every field of cotton being machine harvested sat a service truck or trailer to furnish all the fuels, lubes and greases

It couldn't be done—as cheaply, at least—without the Shell diesel fuel oil Goodall's truck is pumping into this customer's tank out in the desert where land is being leveled to bring more idle acres into production.



needed at "swamping up" time at least once a day. Here at this periodic stop we saw a flock of picker drivers roll their machines up to the service truck and go into action as they re-filled gas and diesel tanks, replenished picker oil for the picking heads, operated grease and lube pumps to force the proper greases and oils into each hole and area where needed. All the famous colors, brands and names of oil companies were seen as we drove from field to field—Texaco, General Petroleum, Richfield, Standard Oil Co. of California, Shell, Union, Associated. By mid-afternoon, the writer caught sight of the yellow-and-red tank truck of a local Shell distributor leaving one ranch headquarters and heading for another. As the driver turned into the ranch home, we followed. Cotton was all around the farm yard, peeking through the fence and waving a fluffy salute to the owner on his International picker as he dumped a basket of fresh picked cotton and drove back into the field.

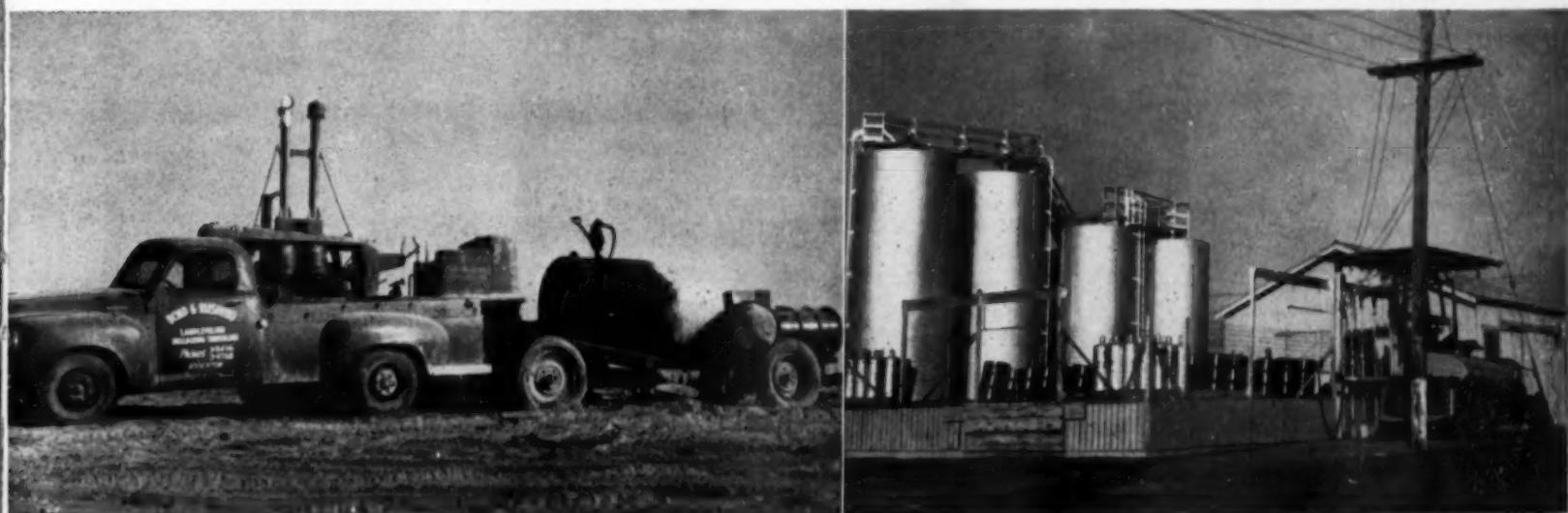
"Where do you go from here—to another ranch for delivery or back to town for another load?" the

awaiting service before going back on the job. Two other crawler diesels were working off in the background.

This big land levelling job would speedily and cheaply add another square mile of irrigated cotton-grain farming to the West Side agriculture by tripling the value of the raw desert land and turning it to crops. We went back to the outskirts of town to see Shell deliver aviation gasoline into an overhead tank used by a crop flyer who had to have it refilled a time or two every day during the height of the cotton harvest. He was putting on defoliant to drop off the leaves and make mechanical cotton picking easier and cleaner. With three such varied deliveries from one little Shell distributor in one county, the visiting cameraman had enough for the day and headed towards his hotel. But, wait. Just ahead, as he entered Wasco, he noted the distributor's storage tanks and office and decided to stop and get the story from the man who managed and directed it to service this farming system in competition with other brands and names as efficient

Said George F. Caulfield of the San Francisco office of Shell Oil Company when asked to elaborate on the Shell farm service in the San Joaquin cotton belt, "Shell Farmer No. 1 has 18,000 acres of cotton near Corcoran. Each month he takes 11,000 gallons of gas, 12,000 gallons of diesel fuel, 1250 gallons of automobile lubricating oil, 2,000 pounds of grease. For the cotton harvest season, he takes 3,000 gallons of cotton picker oil, and 500 gallons of aviation fuel go into the ranch plane. Monthly bill for oil field products approximately \$6,000. On his ranch to efficiently service this bill of goods delivered by the Shell distributor he has two service wagons that contain bulk storage tanks for lube oils, diesel and gasoline, with complete lubrication facilities. His service shop has two pumps similar to those in a service station for diesel fuels, and another pair of pumps for gasoline. The ranch has bulk storage for 40,000 gallons of fuels.

"Shell Farmer No. 2 in our cotton belt of California has a medium size 5,000-acre farm. He needs 2,000 gallons of gas, 5,000 gallons of diesel, 150 gallons



Land levelling, bulldozing and such land shaping jobs have become big business with fleets of diesel equipment doing the work fast and cheaply. Bond & Rushing are one of those firms kept supplied with oils, greases and diesel fuel in western Kern County.

visitor asked. "I've got a delivery coming up next out on the edge of the farming area where the biggest land plane in the world is working for a Stockton custom operator who is levelling a raw piece of ground as he changes the desert to high priced irrigated cotton-grain land; come along if you like."

The Shell truck went out through town and headed south and west to the edge of crop lands and then on into the great open spaces where Miller & Lux cattle pastured in the pre-farming days of a half to three-quarter century past. Off to the right we spotted the rising dust clouds that located the various tractors and scrapers, levellers and such land clearing and shaping equipment as is teamed with the giant diesel tractors. "Better leave your car and climb in with me," warned the driver. "I'll have to go into low and stick with the deep ruts in the dust to get out there to their outfit." We rolled up to the camp where the operators' car, extra equipment and oil dump were. The driver opened up his truck and rolled off the scheduled drums and barrels to keep this big operation rolling. A big HD Allis-Chalmers (GM engine) stood at the edge

and all highly competitive in the great American tradition of business success.

J. E. Goodall was the name on the Shell distributor truck and office. "I serve Kern county with Shell products," Mr. Goodall modestly admitted when greeted and questioned. "I have 210 accounts, 114 of which are cotton-growers, gins, fliers, etc. Most of the cotton pickers are gas up to now but are going diesel as fast as they can get that type. There are in my territory 768 cotton pickers, the biggest land leveller and the first three WD21 wheel diesel tractors delivered. These latter are on H. S. Gittings land levelling operations. Come back and I'll take you around to see this big levelling operation and other high spots tomorrow. My driver has a regular route he covers from day to day each week, so that he usually delivers once to each customer each week." We left the distributor reluctantly without seeing more of his little one-county cotton-grain empire, the place of the oil industry in its pre-war low cost and post-war increased service stood out as achievements above and beyond the national level.

Goodall's place, distributor for Shell in Kern County. His truck covers 210 accounts every week, more than half on cotton.

of automotive lubricating oil, 700 gallons of cotton picker oil (for 3-month season), and 100 pounds of grease monthly. Monthly bill \$2,000; facilities, one service wagon and two pumps, one each for gas and diesel fuels.

"Our Farmer No. 3 is a small operator in cotton with but 1600 acres and needs only 700 gallons of gas monthly, plus 1,800 gallons diesel, 100 gallons of automotive oil, 450 gallons of picker oil (for season) and 100 pounds of grease each month. Monthly bill, \$1,000; facilities for handling these oilfield products, one service wagon and two pumps. These facilities do not include the very important Shell fertilizers, cotton defoliants and other products marketed by the Shell Chemical Corporation."

Since the Shell folks have led the world in developing, selling and servicing such items as NH₃, or ammonia, and their farm near Modesto has become a world capitol for the experimental work in developing agricultural chemicals, that is another story, too big to tell here.

NEW MACK DIESEL

A new automotive diesel has been developed by Mack Trucks, Inc. Specifically designed for installation in Mack Trucks, the engine is manufactured in Mack factories. Designated as the Mack Thermodyne END-673, this new engine develops 170 brake horsepower at 2100 rpm. Torque output is 480 lb. ft. maximum, at 1200 rpm. Exhaustive laboratory tests and extended operation in the field reveals that the new engine is capable of consistently delivering greater mileage per gallon of fuel than ever before achieved by an automotive diesel of its size.

The most outstanding feature of the new engine is its combustion chamber design which is primarily

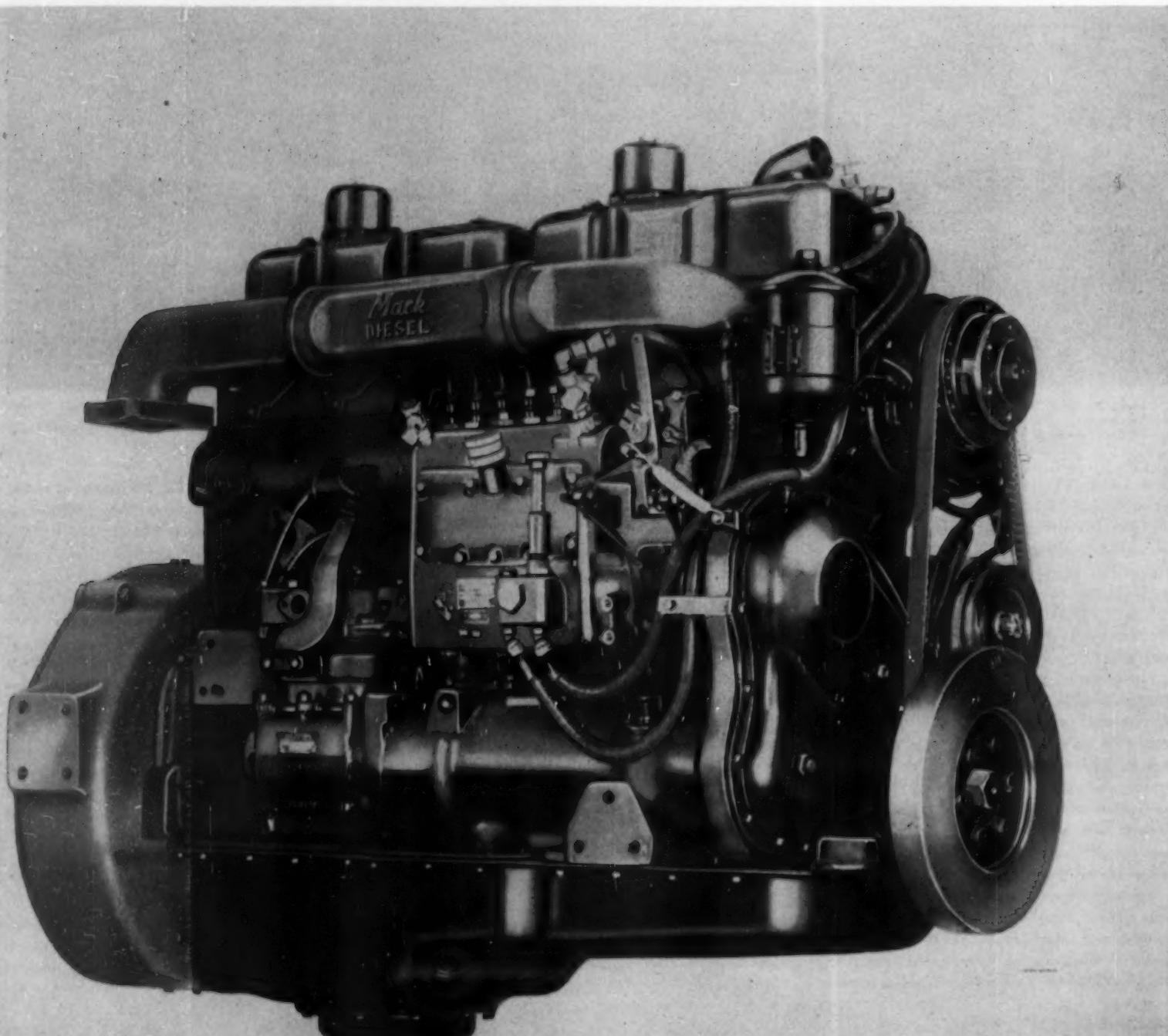
responsible for its fuel economy and which is the culmination of years of intensive research and development. Formed entirely in the piston crown, the combustion chamber is semi-toroidal in shape with an essentially flat cylinder head surface. The design of the intake port imparts a tangential direction of flow to the incoming air which results in a swirling motion in the combustion chamber.

As the piston head rises, the semi-toroidal shape of the piston crown accelerates the swirling air into a vortex traveling at such tremendous speeds that it literally tears the fuel spray to atoms as the fuel issues from the injection nozzle. Combustion is rapid and complete.

The manufacturer states that in addition to affording complete combustion, the Thermodyne combustion chamber assures more efficient injection nozzle cooling. The newly designed pistons eliminate hot spots by reducing heat concentration in the piston head, while the compactness of the combustion chamber with its reduced heat-injection surfaces, increases engine efficiency. These advantages are said to be particularly evident in the engine's easy-starting characteristics.

To assure positive starting for different operational requirements, a choice of either electrical or air starting equipment is available with the electric system standard and the air system optional.

Right side of the new Mack Thermodyne diesel showing injection pump and governor, air compressor, three-piece exhaust manifold and breather caps mounted on aluminum valve covers.



The most popular features of previous Mack diesel engines are also incorporated in the new Thermodyne diesel. Operators will recognize the highly-dependable Bosch multiple-unit injection pump, with the typical Mack drive directly from timing gears, and rigid flange-mounting. High-pressure piping connects each plunger-type pump to its four-hole spray-type injection nozzle. Nozzles are water-jet cooled and can be tested with removed nozzles for spray checking while the engine is running.

Lubrication is of the full pressure type, a large gear-type oil pump being located at the bottom of the sump, where it is accessible from below through a round cover. The pump is guarded by large-area cylindrical strainer with an open top. This strainer is attached to the cover below the pump and is easily removed for cleaning without disturbing anything else. The pump is driven directly through helical gears from the auxiliary shaft.

Injection is rack-controlled by a variable-speed hydraulic centrifugal governor, to produce an engine speed corresponding to the position of the accelerator pedal. This is similar to the throttle control of a gasoline engine, except that the governor automatically compensates for variations in load placed on the engine.

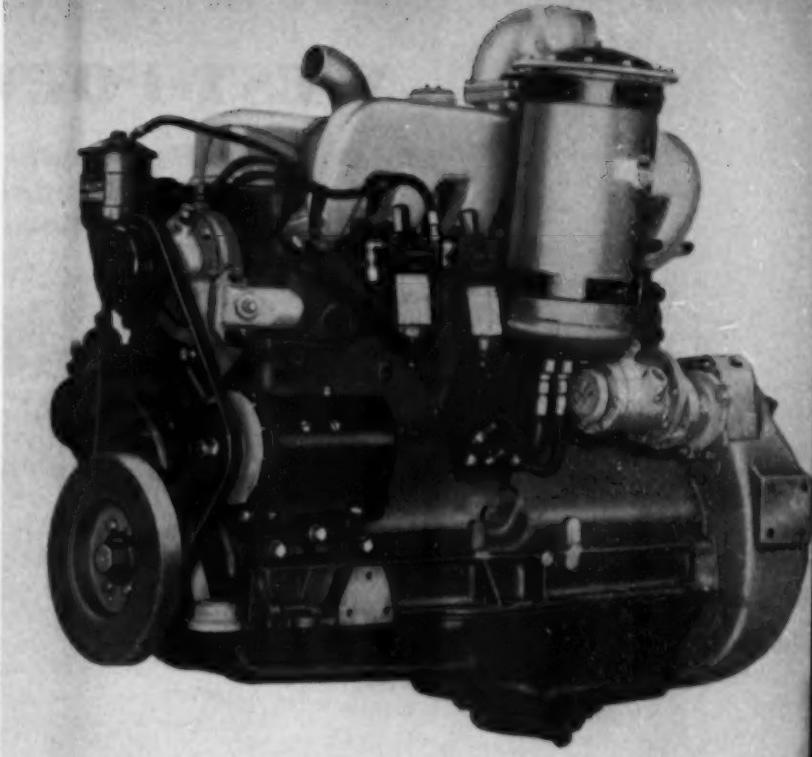
In addition to the torque control and speed-droop characteristics, the governor completely shuts off fuel when the engine is drifting. While this results in some fuel saving, it is much more important as a control and safety factor, since it permits full utilization of the retardation, or braking, effect of the high-compression engine.

The exclusive Mack Synchrovance is also incorporated in the Thermodyne diesel. The Synchrovance automatically advances or retards injection timing according to the engine speed, eliminating premature firing at slow speeds and providing maximum advance as speed increases. Smooth-running, full power development and economy are claimed as a natural result. In addition, easy starting is greatly facilitated. Other traditional Mack diesel engine features worthy of note in the Thermodyne diesel are: Timing gears of extraordinary durability are five in number, all upset, end-grain drop forgings, case-hardened with helical teeth, generator ground. In the nearly forty years they have been used in Mack engines, there is no record of these timing gears ever having worn out in service.

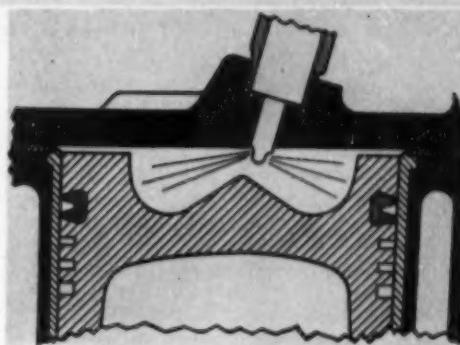
The massive seven-bearing crankshaft is fully counter balanced both statically and dynamically by twelve integrally-forged counter-weights. Its journals are induction case-hardened and journal fillets are pre-stressed by roller burnishing to increase surface strength and prolong crankshaft life. Torsional vibration is absorbed by an improved viscous-type damper. Connecting rods have caps split at a 35-degree angle to accommodate 3-inch crankpins and still permit withdrawal through the cylinder bores. Mating tongue-and-groove surfaces lock the caps positively and relieve the retaining capscrews from shear.

Mack points out a further advantage resultant

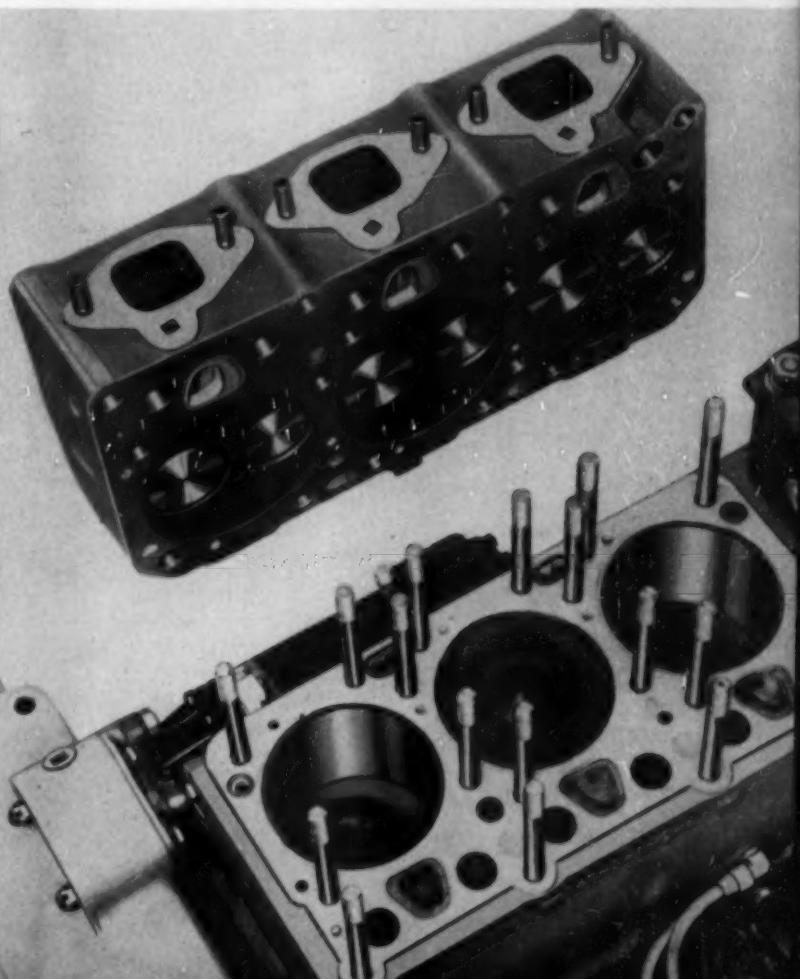
Left side of the Mack Thermodyne diesel showing the viscous vibration damper, generator drive, water pump, fuel and lube oil filters and one-piece aluminum intake manifold.



from its policy of building the Thermodyne diesel specifically for installation in Mack vehicles, namely: a balanced design of engine and chassis achieving peak performance, reliability and superior accessibility for easier, more economical service and maintenance. The new Thermodyne diesel is offered in Mack trucks and tractor models of the LJ series, H series, W series and B-61 series.



Drawing of the Thermodyne combustion chamber showing inclined position of the injection nozzle and direction of fuel spray.



View with one head lifted, illustrating flat head deck and toroidal shape of combustion chamber in piston crown.

WEST POINT, NEBRASKA

One 1,300 Hp. Nordberg Engine Generates 72 Per Cent of Plant Production in Three-Year Period at Fuel Cost of 4.23 Mills/Kwh.

By C. V. STEWART*

ONE 1,300 hp. Nordberg Duafuel engine in the West Point, Nebraska municipal power plant has saved more than \$35,000.00 in fuel costs while generating 8,964,700 kwh. in its first three years of operation. Consuming natural gas at an average cost of \$0.27 per 1,000 cu. ft. and fuel oil at a cost of \$0.114 a gal., the engine produced a kwh. for a total fuel cost of \$0.00423.

West Point is a community of 2600 population in Eastern Nebraska and its municipal electric system for years has boasted rates among the lowest in the Midwest for its population class. The city purchased the privately-owned steam plant and distribution system in 1921 and installed two 150 hp. air-injection diesels the next year. At that time the residential consumer paid \$0.15 a kwh. for the first 30, then \$0.12 for the next 60 and \$0.10 for any additional kwh. with a five per cent penalty for failure to pay bills on time. In 1928, the city installed a 400 hp. air-injection Busch-Sulzer Diesel and in 1931 a 680 hp. air-injection Busch-Sulzer. In 1932, a new rate schedule went into effect, reflecting the improved generating economy. Price for the first 20 kwh. was \$0.08, the next 30 were at \$0.06 a kwh.

*Commissioner, West Point Light & Water Works.

and excess at \$0.035 with a five per cent discount for payment on time.

In December, 1934, the old 150 hp. units were removed and a new 225 hp. mechanical injection Busch-Sulzer diesel engine installed. By 1941, West Point was ready for another engine and another rate reduction. The outbreak of war stopped delivery of the engine but the rate cut went through. The consumer now paid just \$0.05 per kwh. for the first 20, then \$0.035 for the next 20, then \$0.0225 for the next 60 and a flat \$0.02 for excess. At the end of World War II, the city renewed its contract for an engine and installed in July, 1946, a 750 hp. Busch-Sulzer diesel. At West Point, as in many municipalities throughout the country, this was a period of rising costs. The present schedule, put into effect in 1948, shows, however, that the city has kept its rates low. For the first 30 kwh., consumers pay \$0.050, then \$0.03 for the next 30 kwh., \$0.025 for the next 40 and \$0.022 for excess. These charges are all less five per cent for prompt payment.

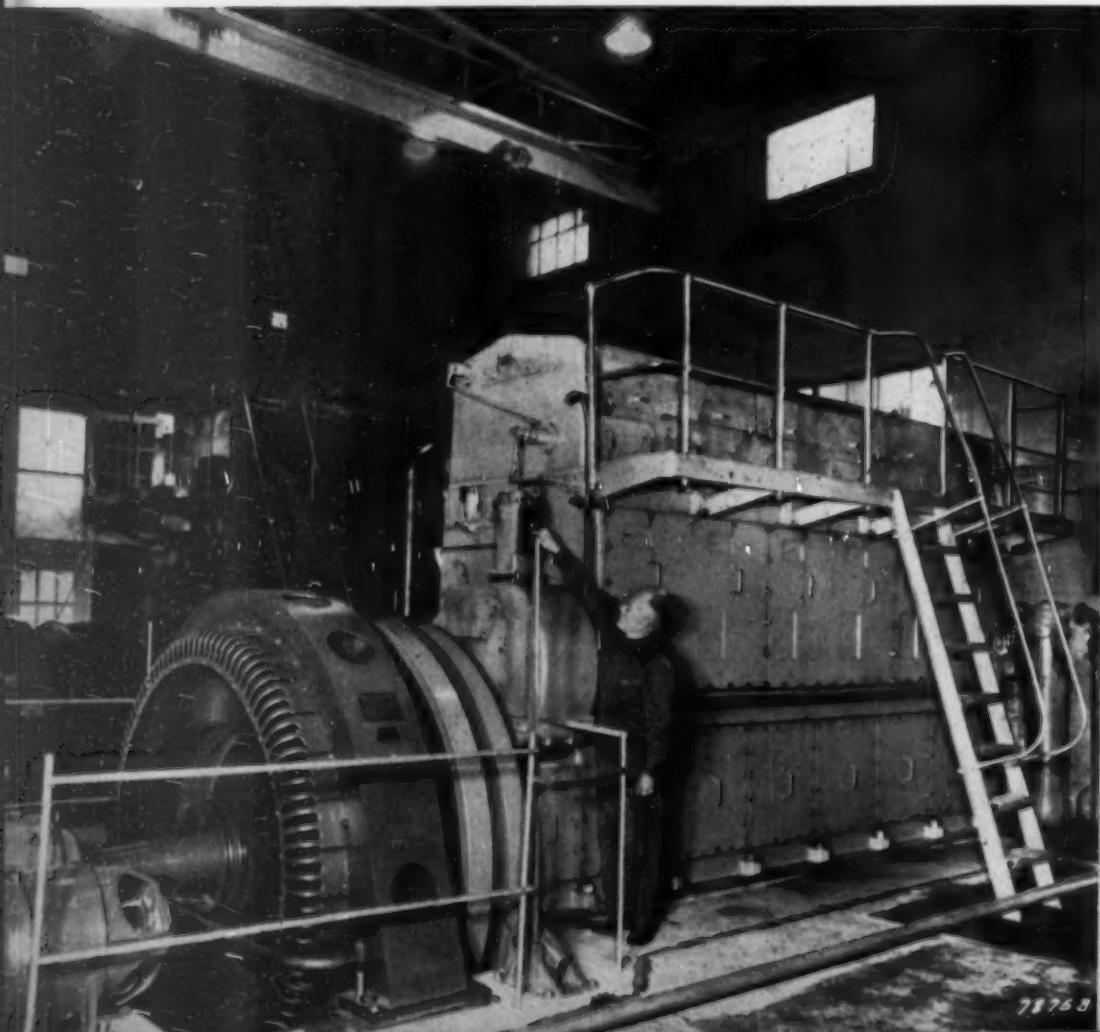
As the rates went down, consumption of electricity rose steadily. Increasing production helped to

hold down overhead costs but the high price of fuel oil was a serious problem. In 1949, with production at 3,291,850 kwh., total fuel cost was \$34,880, an average of \$0.0106 per kwh. The city met this serious problem by removing the 225 hp. diesel and installing a 1,300 hp. supercharged, Model FSG-166-SC Nordberg Duafuel engine. This four-cycle, six cylinder engine has a 16 in. bore, 22 in. stroke and develops rated horsepower at 327 rpm. The engine uses natural gas with a small quantity of diesel oil for pilot fuel. During the three years that the Nordberg engine has operated, the plant has maintained an average fuel cost of \$.608 per kwh. The operating economy of the 1310 hp. Duafuel engine, when considered alone, is even more impressive. During the 3 year period, the new engine operated a total of 16,233 hours, generating 8,964,700 kwh., 72.3 per cent of the plant total of 12,396,600 kwh. Fuel costs for the Duafuel unit in generating the 8,964,700 kwh. were \$37,930.00, or 4.23 mills per kwh. Compared to the oil burning engines cost of 10.91 mills per kwh. during the same period, the Nordberg engine produced a saving of \$59,800.00 for the three years.

The same No. 3 diesel oil used for the oil-burning

Chief engineer adjusts the Woodward governor setting on the 4-cycle, 6-cylinder 16 in. by 22 in. supercharged Duafuel Nordberg. It is rated at 1300 hp. at 327 rpm.

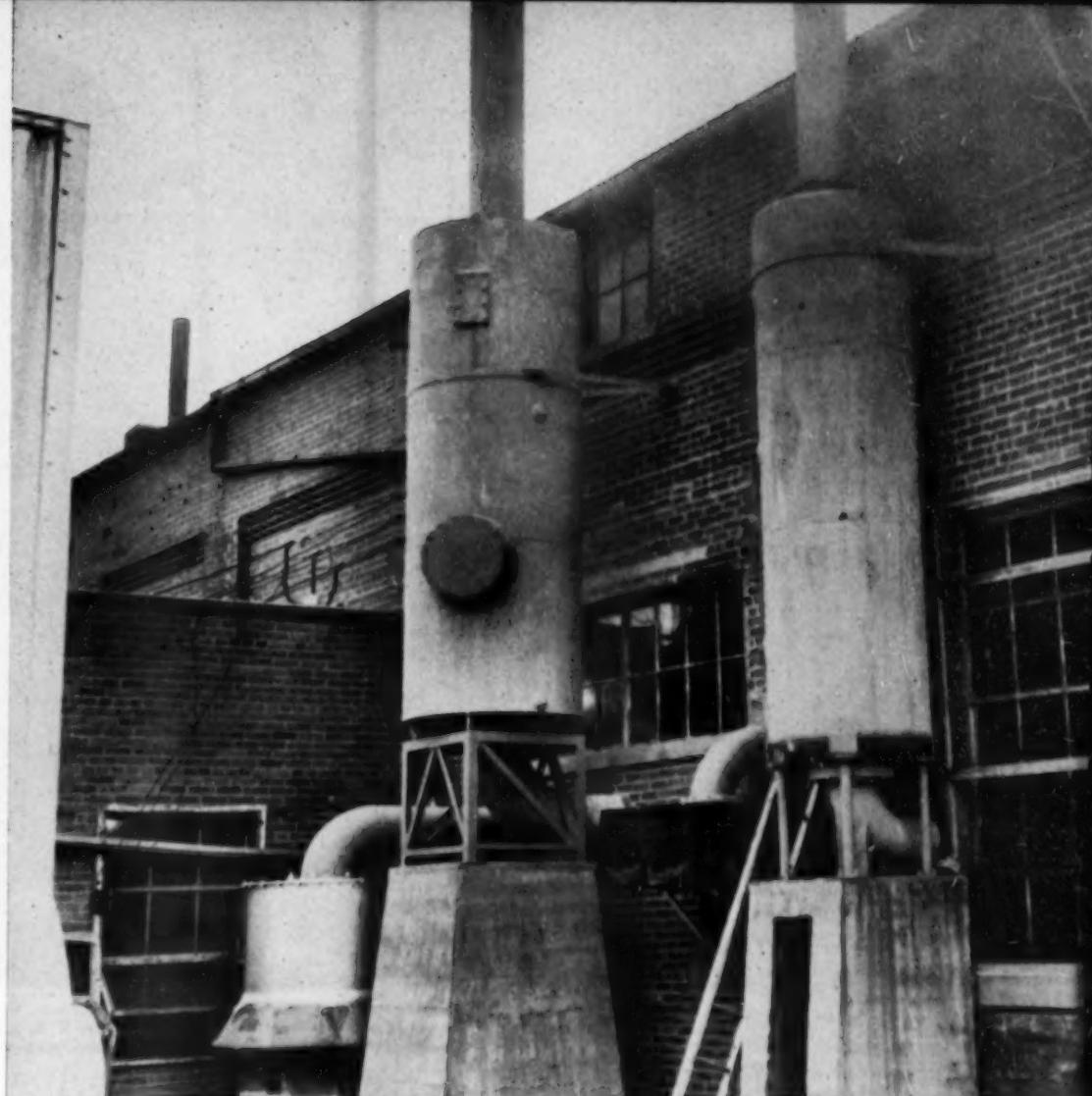
The West Point, Nebraska, municipal power plant. Note the Diesel Service Co. forced-draft cooling tower in left background.



engines serves as pilot fuel for the Duafuel unit. The oil is stored in four tanks with combined capacity of 46,500 gal., and is centrifuged, metered and filtered before it reaches the injection pumps on the Nordberg. The same pumps provide a small constant charge for Duafuel service and a governor-controlled variable quantity for full oil operation. The natural gas is metered at 38 lb. passes through two regulators and a surge tank and reaches the engine at 15 lb. pressure. The gas passes from a header through a cam-operated valve in the cylinder head to a chamber directly ahead the air intake valve and is admitted to the cylinder with the intake air. The engine can be switched instantly from Duafuel to oil operation or can function on varying combinations of the two fuels if gas supply is limited.

Chief engineer John A. Wagner, who has served in the plant since it started running internal combustion engines in 1922, reports that the Duafuel engine is easy and economical to lubricate. Lube is supplied to the cylinders by a mechanical lubricator while a separate pressure system lubricates the bearings and cools the pistons. Included in this circuit are a pair of oil coolers and a motor-driven circulating pump. A small motor-driven pump draws lube from the crankcase and puts it through a Fuller's earth purifier. In addition, some oil is drawn from the system periodically and cleaned in a batch purifier. Mr. Wagner reports that oil and engine are perfectly clean after more than 8,000 engine hours. Lubricating oil consumption is low.

The cylinder lubricators feed 5 gal. of oil in 24 hours and enough of this drains into the crankcase to necessitate removal of 15 gal. a week to keep crankcase supply from rising above the desired



At left are the American Cycloil air filter and the Maxim exhaust silencer serving the Nordberg engine.

level. This means average operation of 11,000 rated hp. hrs. per gal. of lube oil consumed.

All engines in the plant are tied in to a common closed cooling system in which the key equipment is a dual forced-draft cooling tower with three bundles of coils. Two motor-driven pumps handle raw water for the tower spray nozzles and four motor-driven pumps circulate the jacket water. Make-up for the jacket system is treated in a softener. Intake air for the Nordberg is cleaned in an oil-bath filter and passed through the exhaust-driven supercharger to the intake header. Exhaust gas passes through the supercharger to the vertical silencer outside the building. Conveniently mounted on the engine are a multipoint exhaust pyrometer and gauges on fuel, lube, cooling water and starting air. On the wall nearby is a compact alarm panel with visible and audible alarms on jacket water, pilot oil and lube pressures and temperatures.

The Nordberg engine normally runs 16 hours a day with the 750 hp. Busch-Sulzer diesel carrying the light load from 11 p.m. to 7 a.m. With the volume of consumption rising steadily and Duafuel economy holding production costs down, it is expected that profits will go higher. On the basis of past experience, citizens of West Point can look for further dividends.



List of Equipment

Engine—One 1,300 hp., four-cycle, six cylinder 16 in. x 22 in., Model FSG-166-SC supercharged Duafuel engine operating at 327 rpm. Nordberg Manufacturing Company.

Generator—One 900 kw., 1125 kva., 3-phase, 60 cycle, 2400 volt, 80% pf., generator with 15 kw. V-belted exciter. General Electric Co.

Governor—Woodward.

Turbocharger—Elliott-Buchi.

Fuel transfer pumps—Viking.

Fuel centrifuge—Hydroil.

Fuel meter—Niagara.

Fuel filter—Nugent.

Natural gas—Peoples Gas & Electric Co.

Gas meter—Emco-Rockwell.

Gas regulators—Reynolds and Mason-Neilan.

Lube oil—Texaco P40.

Cylinder lubricators—Manzel.

Lube purifier—Honan-Crane.

Lube batch purifier—Renuoil Diesel Service Co.

Lube oil pump—Roper.

Lube coolers—Ross.

Forced-draft cooling tower—Diesel Service.

Raw water pumps—Peerless.

Air filters—American Cycloil.

Exhaust silencer—Maxim.

Alarm panel—Viking.

Pyrometer—Alnor.

Switchboard—General Electric Co.

Air compressors—Gardner-Denver and Ingersoll-Rand.



Looking astern on the *Kahloke*. The massive stack houses seven Maxim silencers. The emergency GM diesel generator is at its base. Capt. Douglas F. Reynolds in inset. Capt. Reynolds is master of the *Kahloke* and Black Ball port captain.

THE DIESEL ELECTRIC SUPER FERRY “KAHLOKE”

By CHAS. F. A. MANN

A NOTHER “first” in Pacific Coast maritime history was made June 27 when the unique new super-ferry *Kahloke* commenced regular fast automobile and passenger ferry service on the 31-mile run between Horseshoe Bay (West Vancouver) B.C. and Nanaimo. Not only did this remarkable ex-New York City passenger ship emerge for the 3rd time in her long life as a modern, fast diesel electric ferry, but also gave competition to giant Canadian Pacific Railroad on marine transport between the principal city of British Columbia and Vancouver Island—the great, green “Front Island” off the B.C. coast that is almost as big as Ireland.

It was a great day for Nanaimo, the principal city on the east coast of Vancouver Island, terminus of the new route, as they have been clamoring for cheaper and faster transportation for the automobile age for many years. *Kahloke*—B.C. Indian for White Swan, will operate 5 round trips daily, with 90 minutes scheduled crossing time. Both *Kahloke* and her parent company, Puget Sound Navigation Co. of Seattle, have each had the most colorful

histories on record. Puget Sound Navigation, headed by Capt. Alexander Peabody of Seattle, in a span of 25 years revolutionized marine transport on Puget Sound. Starting about 1922, the company began transiting a whole fleet of former Sound and ex-Great Lake steam packets operating mainly on North-South runs, to a 100% modern dieselized cross-Sound auto and passenger ferry fleet. So many “firsts” piled up in the process, that the marine world waited each spring to see what PSN and Capt. Peabody would come up with next! The first high-powered single screw, 2-cycle diesel ferry in the USA, the *Chippewa*; the first fully streamlined ship in the entire world, the *Kalakala*, and the first brand new diesel electric overnight combination ferry, *Chinook*, are but a few, as DIESEL PROGRESS readers will remember.

So, Black Ball Line Ltd. of B.C. can boast of a famous ancestry dating back to Clipper ship days. Boasting of being the sole passenger vessel put in service in 1953 in all of North America, *Kahloke* was built from the main deck up, as well as below,

out of the remaining stout iron hull of the old steam San Francisco auto-passenger ferry *City of Sacramento*, at Yarrows, Ltd.’s giant shipyard at Esquimalt (Victoria) B.C. In turn the *City of Sacramento* had a fantastic, lucky history. Back in 1903, the *Asbury Park* was built at Cramp’s Shipyard in Philadelphia, for the Central Railroad of New Jersey, operating out of New York City on the Sandy Hook run, principally as a modern deluxe passenger ship. She carried 9 boilers and a pair of smooth 4-cylinder triple expansion steam engines. In 1918 she was brought to San Francisco by the Monticello Steamship Co. and in 1922 was converted to a fast auto and passenger ferry to operate at Vallejo. When the bridge was built at Martinez, the S.P. Golden Gate Ferries Ltd. tied her up and Capt. Peabody bought her for his expanding fleet on Puget Sound. No steamer ever ran faster on the Sound.

Time and the march of progress overtook the *City of Sacramento*, and PSN too, when the State of Washington took over the ferry business. Used only

as a spare boat, because of her expensive steam power plant, the ship led the life of Riley doing nothing but standby duty. As one of the ships not going over to the PSN's fleet, the company thus had a fine, solid ship to convert for the new Canadian service, and brought it to Yarrows for the big rebuild.

On the U.S. side of the border it may be difficult to distinguish between a plain conversion to diesel and a complete rebuild under the somewhat harsh Canadian Maritime laws prevailing since 1951.

The *Kahloke* was stripped down to the wood deck-ing on her auto deck and everything in the machinery room taken outside and scrapped. Only the hull and tanks were left. The fancy solid wooden superstructure was junked. Then the ship was completely reconstructed like new, after the most thorough Scotch and Canadian methods, not only for coastal waters, but certificated for Gulf of Georgia and Straits of Juan de Fuca use, in all weather. The Canadian Board of Steamship Inspector's rules then only left Yarrows Shipyard with a fine hull and main watertight bulkheads to start creating the *Kahloke*.

She has the following principal dimensions: length, B.P. 298 ft. 5 inches; length overall, 307 ft. 2½ inches; beam, moulded, 50 ft.; extreme beam over sponsons, 59 ft. 8¼ inches; depth moulded to car deck, 17 ft.; car deck to saloon deck, 14 ft. amidships; saloon deck to boat deck, 8 ft.; draft, fully loaded, 12 ft. 9 inches.

The heavy steel deckhouse; huge canal lock type double front and rear watertight doors on the car deck, extra fire bulkheading and stiffening and plating over the bracket supported sponson, raised

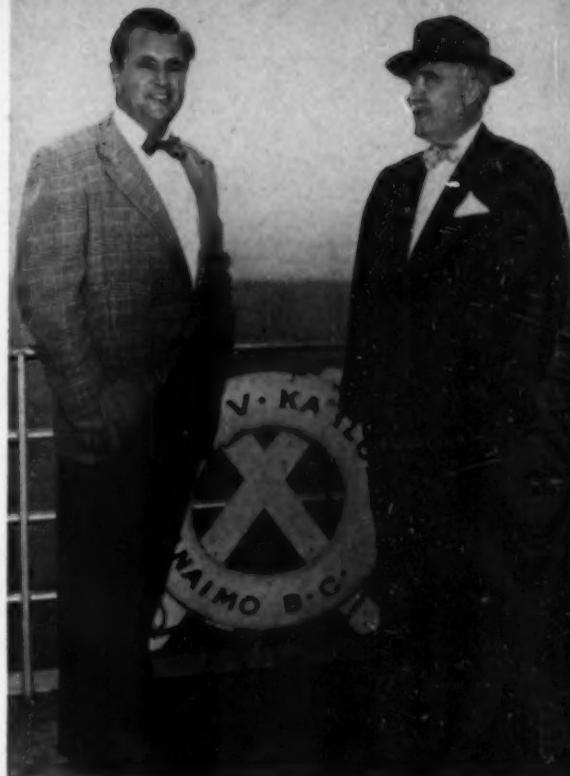
the tonnage from the original of 1850 to 2475 tons, despite the far lighter weight of the modern, high speed diesel electric power plant.

As with everything else with the famed "Peabody Touch," the machinery has as colorful history as the owners and the hull. Actually the entire idea of the diesel electric power plant is as big a tribute to the ingenuity of Cleveland Diesel Division of General Motors as the machinery itself. Shortly after the Navy found itself surplus with the Destroyer-Escort type ship, Capt. Peabody bought three complete surplus DE's and decided to embark on a type of propulsion not yet generally used, the lightweight 2-cycle diesel electric drive with geared twin motors on the propellers. As usual, history was made on the waterfront at Seattle. The entire power plant, including auxiliaries, diesels, propellers, shafting, heat exchangers and control systems was taken out of a scrapped DE and put in the brand new *Chinook*, luxury ferry completed 5 years ago. Since that time, it has operated over 400,000 miles in revenue service without missing a schedule.

When plans for converting the *Kahloke*, or rather creating the ship, were drawn, a second complete set of machinery was transported by barge from Seattle to Yarrow's and put aboard almost intact! And practically a brand new 6000 hp. power plant. So, while it may seem on the surface that *Kahloke*'s machinery is old or used, actually the DE from which it came had run less than 3,000 hours before going out of commission. Just broken in. By comparison, the *Kahloke* schedule will use up 3,000 hours of engine life in about 160 days!

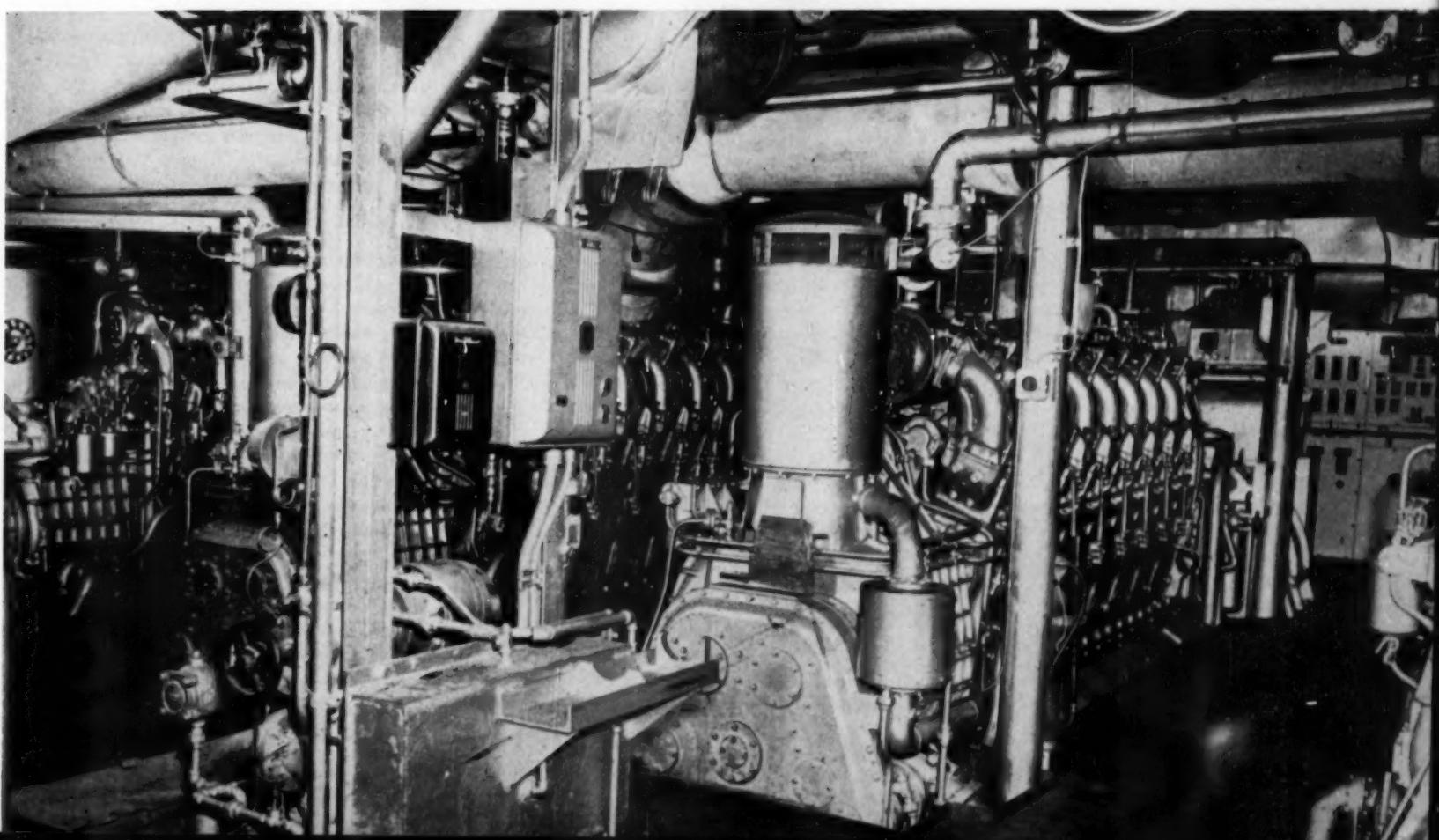
Design of the new ferry has caused widespread favorable comment throughout the U.S.A. and Canada because of her unique safety features and luxurious

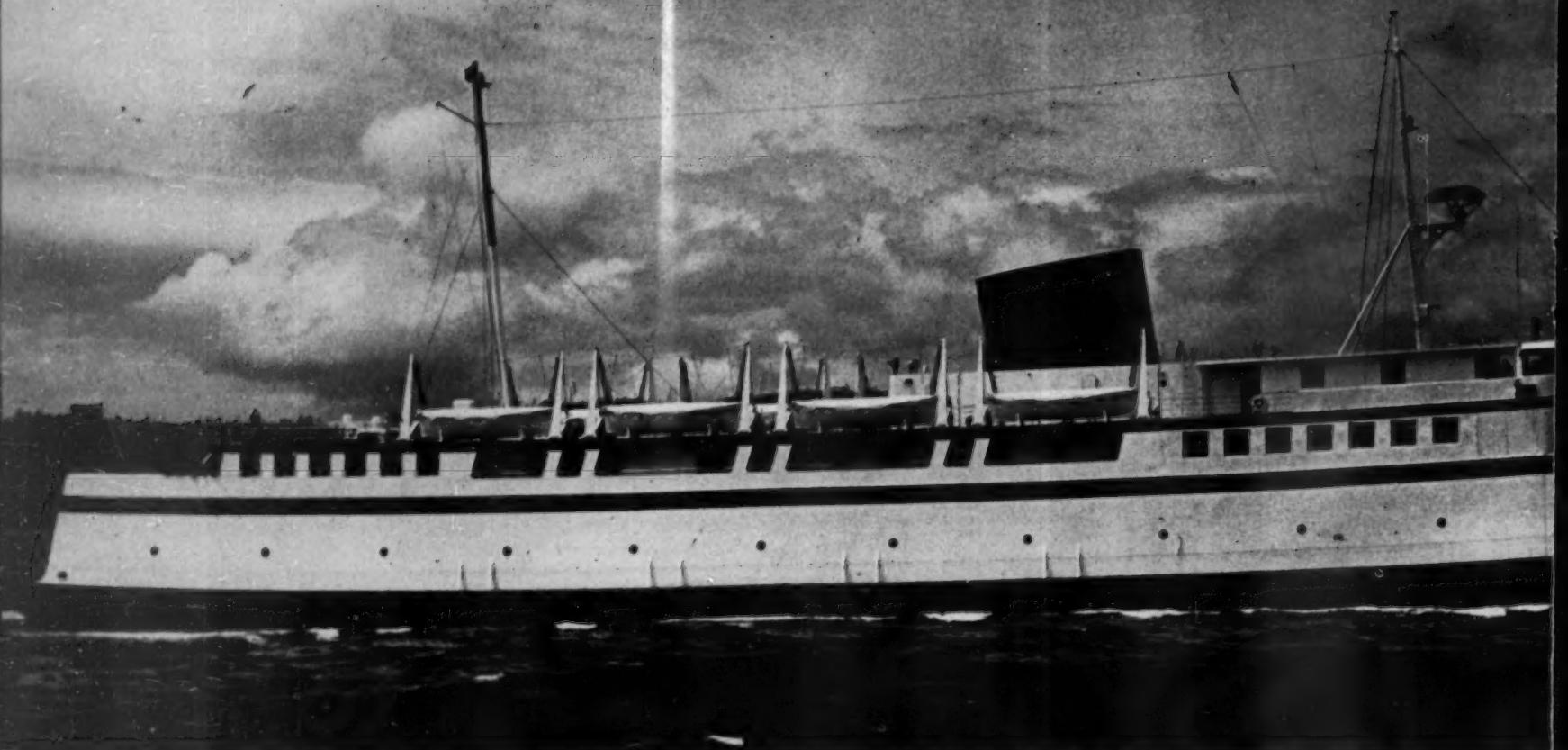
The main power is provided by four GM Cleveland diesels Model 16-278A, 1700 hp. at 750 rpm. Allis-Chalmers generators, Marquette governors and Ross heat exchangers.



Captain Alexander M. Peabody, chairman, Black Ball Ferries, Ltd. of Victoria, B.C. (right) and Roger Williams, general sales manager of Cleveland Diesel (left) on the trial run of the *Kahloke*.

appointments for this class of service. Gilbert Anderson, naval architect for Yarrows, was in charge of designs, and his giant red smokestack gives the steamboat lovers a thrill. But even this is practical, because it had to be that big to house six giant exhaust mufflers that makes the diesel machinery as quiet as a turbine ship. Chris Palliser, engineering





superintendent in charge of the entire *Kahloke* construction, supervised the building as his last project before retiring after 40 years with the Yarrows yard.

Among the construction highlights were renewing 50 large shell plates; a complete new steel car deck; two main watertight bulkheads; a new fresh water tank; anchor pocket recesses in the sponsons, a big item considering the vast quantity of heavy stud link chain required for the great depths of the Gulf of Georgia across which she operates. The former open brackets that carried that sponsored ferry deck were plated over, and the entire superstructure is heavy all welded steel to the highest class of Canadian specifications. She carries twin tubular steel masts and the ingenious extra large stack housing the elaborate exhaust muffler system. She will carry 80 mixed load vehicles or a maximum of 100 passenger automobiles and 1,000 passengers. All facilities are planned for a 90 minute run, hence nothing was wasted for space or added luxury for a long run or overnight use. Automatic heating and air conditioning; mechanical ice water coolers and a complete P.A. system for passenger announcements has been provided on the passenger and auto decks. Windows on the car deck have been reduced to practically zero to encourage people to get out and go upstairs!

No posts mar the 275 ft. car deck and vehicles drive straight on and off without turning, a new feature in Canadian ferries. Roomy space between autos is a feature to permit easy access to parked cars. Skidproof walkway plates separate the car lanes on each side. The superstructure is unique and contains many features never before used in a Canadian ship, and is practically 100% fireproof. Forward on the car deck are a pair of huge canal-lock

type watertight doors, operated by a power screw forward of the main passenger deck. Four inch square strips of soft rubber fastened with bronze screws around the entire perimeter both halves of the doors, make a water tight closure big enough for the largest trucks to pass through, or two lanes of automobiles, yet tight enough to buck heavy seas at full speed. This costly requirement arose after the swamping of a ferry last year in the Irish sea.

At the stern of the car deck an identical pair of doors, but hand operated, were fitted. Fireproof folding door sets crosswise at the center of the car deck, to divide it into two fireproof sections, are fitted. The car deck has a clear height of 14 feet, big enough to take the highest trucks permitted to operate in British Columbia, and is six lanes wide with narrow engine trunk in the center, and equipped for fast two-lane drive-off at either end. The passenger deck is divided into four main spaces, the huge forward observation lounge, seating 235; the pair of midship lounges seating 325, served by a checkroom and magazine stand, and public ship-to-shore telephone; the after lounge seating 38; cocktail lounge seating 38 and the huge coffee bar seating 92.

The center lounge is for the passenger who has made the trip many times, and features comfortable spring bench seats and adequate smoking facilities, and two washrooms. The coffee bar is done in rose and walnut, and the entire counter and galley is 100% electric, including stoves, refrigerators, etc., and 100% executed in stainless steel. A Moffatt range is fitted.

All lighting is of the cold fluorescent type, in troughs and in grilled type fixtures. Stairwells fea-

ture shaded lights at knee level producing high level of light on the stairs instead of the walls and ceiling. Amtico Rubber floor tile was used, and steel furnishings by Simpsons Pacific Ltd. of Vancouver. All stainless steel work was by Quest Sheet Metal Works of Vancouver. The entire ship is 100% sprinkled, either by a water system or CO₂, and special fireproof base is underlaid all galley and toilet areas, then surfaced with cement and marble chips.

A unique feature, never before used in Canadian ships, but highly successful on the *Chinook*, is the entire absence of wall paneling over the steel wall plates, side and ceiling beams. Ingenious use of paint and lighting has actually made a pleasing decorative effect out of painted bare steel plate! And further reduced the fire hazard.

The Grinnell automatic sprinkler system is used throughout the entire ship, except engine room and propulsion motor room, where an elaborate automatic Kidde CO₂ system is fitted with spaced heads that let go when temperatures exceed a given point, sounding a warning bell for the crew to leave pronto before they too are extinguished. A 30 hp. Fairbanks-Morse pump feeds salt water to the automatic sprinkling system used on the car deck and the passenger spaces. The top deck is unusual in that it carries not a single sleeping space for any crew member. For the first time in ferry boat history, the entire complement of officers and crew live ashore, at Horseshoe Bay, and three complete crews simply rotate on the basis of 16 hours off and 8 hours on duty. So, on the upper deck, aft of the roomy pilot house, we find a simple officers day room and a captain's day room, followed by four private passenger sitting rooms, where busy Vancouver business tycoons, for a slight extra



The pilot house of the *Kahloke*.

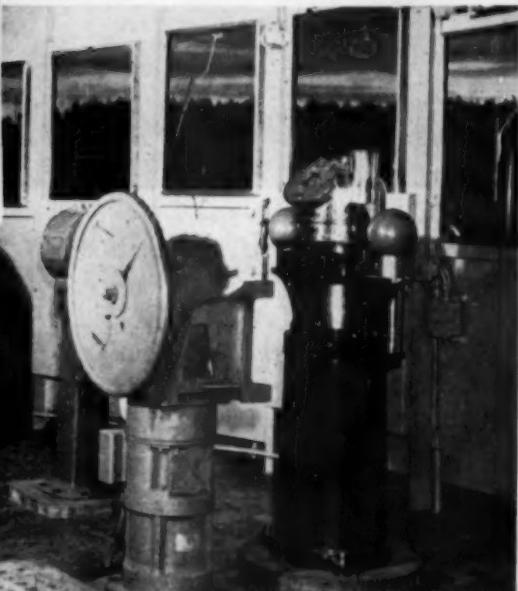
charge, may have privacy for the 90 minute crossing. Two toilet rooms and the emergency diesel generator room are aft of this space.

Then comes more of the results of the tough new Canadian Safety Laws. These new laws, by the way, followed first the abortive fire which destroyed the Great Lakes ship *Hamonic* two years ago with terrible loss of life in a fantastic fire at dockside; and the sinking of the ferry *Victoria*, in the Irish Sea, when a huge wave rolled in the thin, leaky bow doors, down the auto deck and into the engine hatches, and sank the ship in a matter of minutes. The life preserving phase really got a tightening on all Canadian ferries after that.

Besides 1050 lifesaving jackets in handy wall compartments in the passenger spaces, *Kahloke*, on the top deck, which is a vast flat promenade space the whole width and most of the length of the ship, are to be found 8 large 26-passenger steel lifeboats, worked by Wellin-McLachlan No. PHA 6½ screw

davits; 10 lifebuoys; 102 16-person buoyant life-rafts—more than on some ocean liners, mind you; one Shermuly line throwing apparatus and 1 complete set of rockets and flares with firing apparatus. No ship ever built in the whole wide world compares in safety features with the *Kahloke*, and already all over the world are inquiries for specifications pouring in to the owners and Yarrows Shipyards, as well as the Victoria, B.C. office of the Canada Steamship inspectors. *Kahloke* is as near fire-proof and safe in the worst weather, as it is possible to build her with known materials and methods.

Below the car deck, the general layout is as follows: large chain locker forward, to handle the huge anchor chain, 120 fathoms of heavy stud link chain made of 1½-inch steel. This chain carries two 4500 lb. Baldt anchors and a 1230 lb. Stream anchor. A No. 2 vertical Hyde electric windlass, powered with a 20 hp. 440 volt ac. motor handles the anchors which may go deep at certain points on the run. Next is a large store room, followed by

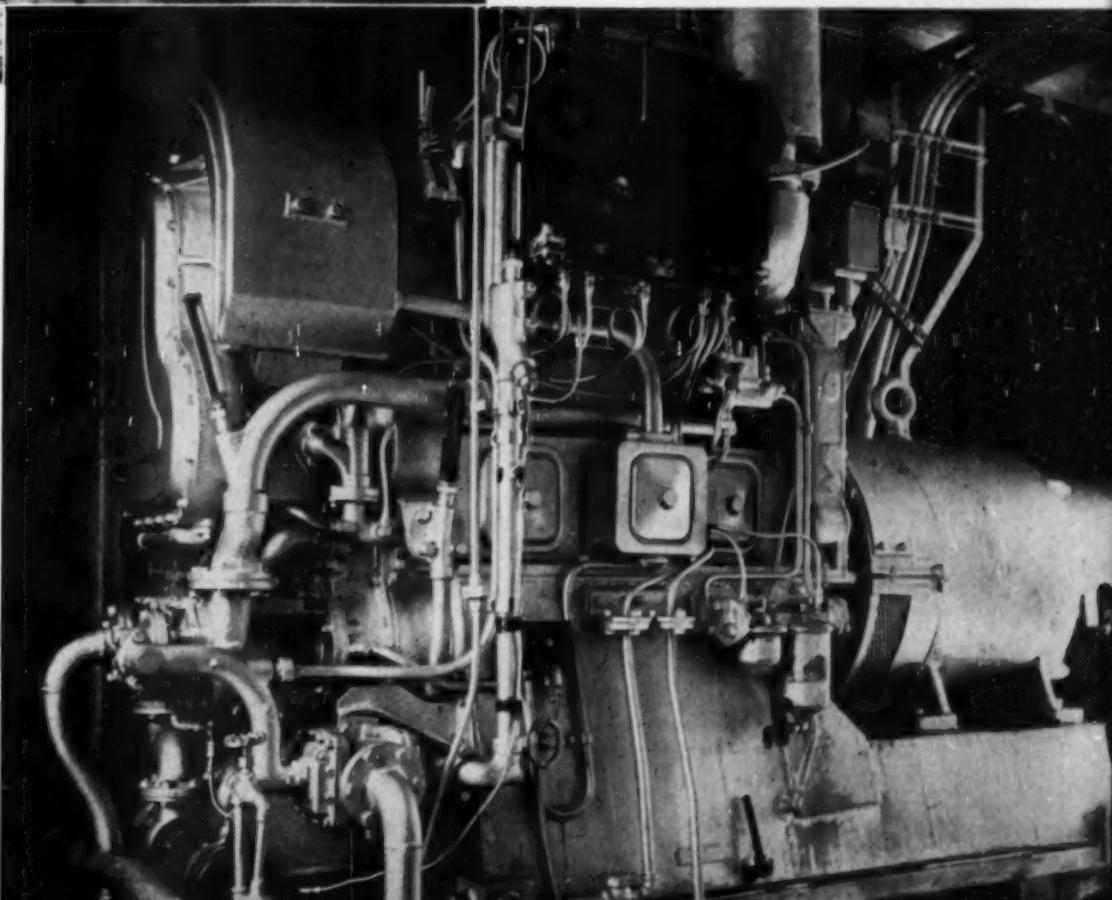


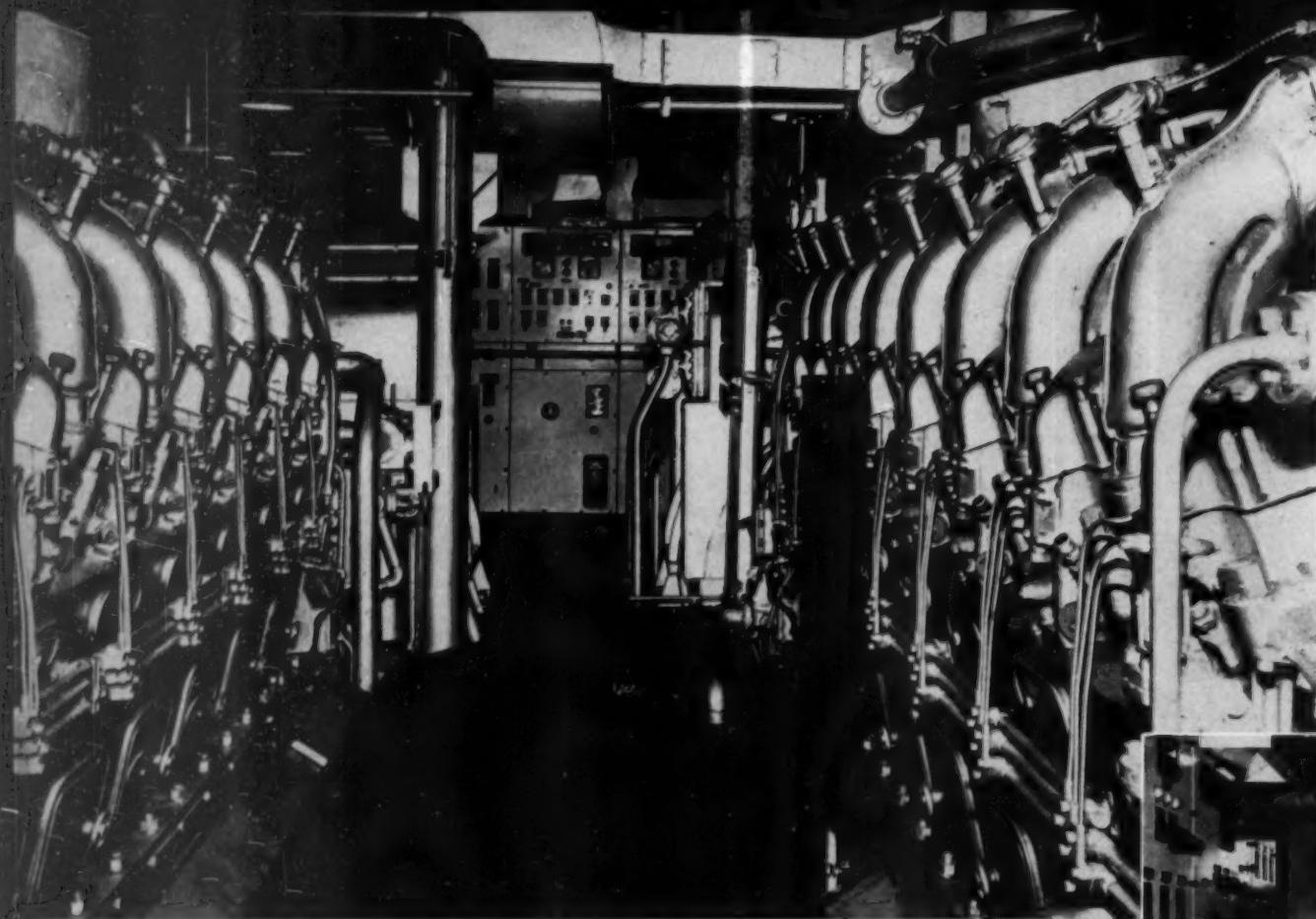
an attractive engineers' day room and wash room and locker space. Midships is the twin engine room layout, one with the 4 main diesel generators and switchboards and the other the motor propulsion room and auxiliary diesel space. Aft is a large crews' day room and toilet facilities, then the CO₂ fire equipment room, with large capacity CO₂ and foam smothering storage tanks. Extreme aft is the steering gear and workshop space. Steering equipment consists of a Hyde Windlass Co. twin motored steering engine, type 14915, with Westinghouse motors.

On her builders trials in the straits, off Victoria, it soon developed that the two 98 x 78 inch 4-bladed Coolidge bronze propellers were not delivering full power. At considerably less than the 6,000 shaft horsepower rating, *Kahloke* developed just under 19 knots, and is expected to better this after new propellers are fitted, to permit using full power. Her scheduled run calls for an 18 knot steady speed.

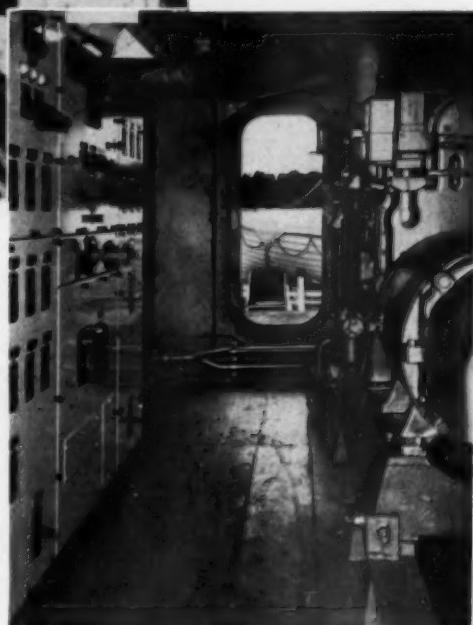
The promotion of the new ferry was as unique as its design and equipment, and all tied together to inaugurate a new ferry route as well as a new diesel electric ferry. The writer of this article never saw a more enthusiastic spirit among the staff of a large shipyard as he did while *Kahloke* was under construction. The stiffly formal old time atmosphere was gone. Everybody working for Mr. Clarence Wallace, president, and Mr. H. A. Wallace, vice-president of Yarrows, realized that this was the only ship for the service and it had to be a success and had to be done on time, what with national attention focused on the inauguration of a brand new vital ferry service. With Capt. Peabody, chairman of Black Ball Line Ltd. and George Paulin,

The GM diesel emergency set Model 3-268A, 150 hp. Delco generator, Marquette governor, Ross heat exchanger. The engine is installed on the boat deck.





Two of the four GM Cleveland main diesels Model 16-278A on the *Kahlake*, 1700 hp. at 750 rpm. Allis-Chalmers generators, Marquette governors, Ross heat exchangers.



Another view of the GM emergency generating set on the boat deck of the *Kahlake*.

president, as hosts at the inaugural run June 27, more than 1,000 distinguished people from all parts of the U.S.A. and Canada gave the vessel a rousing sendoff.

Under the command of Captain Douglas F. Reynolds as master, three complete crews of 25 men each are manning the new ferry in 3 shifts. Capt. Reynolds is also marine superintendent for Black Ball Line Ltd. Captains include B. G. K. Owen-Jones, Roy Barry and J. L. MacCauley. Chief and port engineer is B. O. Tollefson, and chief engineers are R. G. Greaves, C. L. Hudson and William Weston.

Kahlake, British Columbia's first diesel electric ferry, has aroused half of that great province to what can be mildly understated, terrific enthusiasm, of front page type for a whole month!

Principal Mechanical Features and Tank Capacities—The "Kahlake"

Main propulsion consists of four General Motors model 16-278A diesel engines developing 1700 bhp. at 750 rpm., each equipped for air starting. Each of these diesels drives a 1200 kw. Allis Chalmers 525 volt dc. generator with attached air coolers. Excitation is provided by three motor generator sets, driven by a 30 hp. 1570 rpm. 440 volt 3 phase 60 cycle ac. motor. Generator exciter is 8.5 kw., 0 to 120 volts dc.; propulsion motor exciter is 8.5 kw. 0-120 volt dc. and the constant power generator is 2 kw., 120 volts dc.

The main engine fresh water coolers as well as lube oil coolers are all Ross with Fulton Sylphon regulating valves. Each diesel has a Purolator lube oil strainer, with wire wound edge type filter element of metal ribbon. Four Engine Life lube oil filters have cotton yarn elements. Two Worthington 2-

stage 11.4 cfm. output compressors at 700 rpm. against 600 lb. pressure, each driven by a 7½ hp. motor are installed.

Auxiliary power is provided by a pair of General Motors diesels, model 8-268A, each delivering 350 bhp. at 1200 rpm., and driving a 240 kw., 440 volt ac. Delco generator. One is ample for the normal auxiliary power load and one held for standby. Both are mounted on special mountings in the propulsion motor room.

An emergency diesel generator is provided at the base of the giant smokestack on the top deck. This unit is a General Motors diesel, model 3-268A 150 hp. unit, delivering 100 kw. at 1200 rpm., at 440 volts ac. and equipped with full automatic electric starting from a small battery set. The main auxiliary and emergency diesel sets all are equipped with Maxim silencers, Marquette governors, Ross lube and water heat exchangers and detached filters and strainers and Fulton Sylphon valves.

The diesel oil transfer pump is a 20 gpm. Kinney electric. One Sharples and one De Laval oil centrifuge each of 225 gals. per hr. capacity is fitted. Lube oil purifiers are twin De Laval model 65-13 units of 225 gals. per hour each, capacity. Lube oil transfer pump is a vertical rotary Blckmer unit, with capacity of 50 gpm. at 572 rpm. Exhaust mufflers consist of four Maxim, with built-in spark arresters. Propulsion motors are arranged in pairs, with two motors driving each of the two shafts. The motors are 1500 hp. 525 volt dc. Westinghouse, delivering full power at 600 rpm. Each has a built in air cooler, served by a cold water radiation unit on top of the housing, and by a circulation fan.

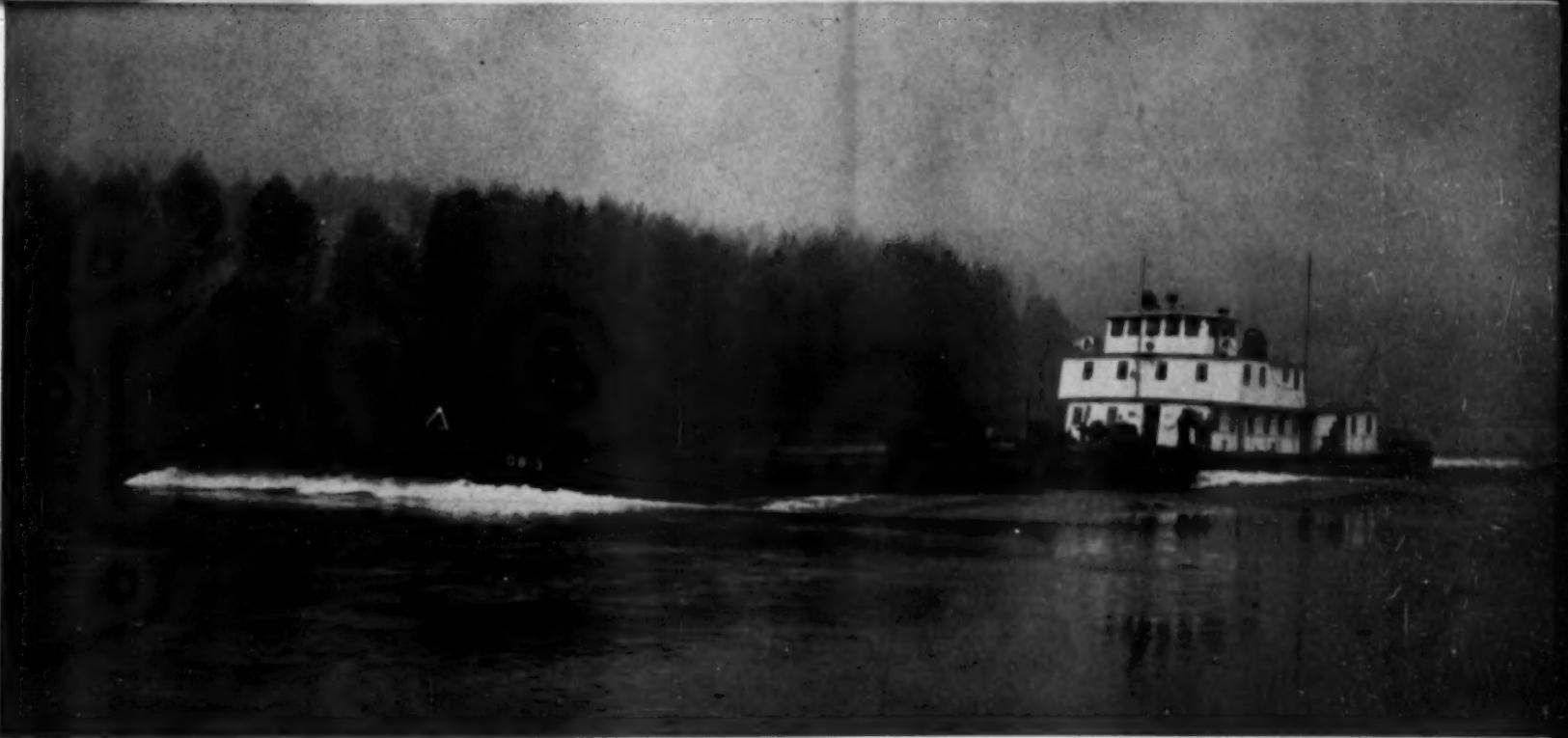
Each pair of propulsion motors operates through a twin Farrel Birmingham reduction gear, with 1.81 to 1 gear ratio, delivering 3000 hp. at 331.5 rpm. at

maximum speed. A built in thrust bearing is a part of each gear unit. Control panel is a very elaborate, large Westinghouse dead front panel. Three Westinghouse vertical oil pumps keep the reduction gears lubricated and cooled. Elliott Co.'s L.O. strainer is fitted in the gear oil circuit and two Harrison oil coolers for the reduction gears.

A new, highly successful European seawater protection system has been fitted to prevent corrosion and marine growth on passages for salt water. This is the Guldanger Cathodic Seawater Protection System, sold and serviced in Western Canada by the Cathodic Protective System of Victoria, B.C. Three 50 hp. Pacific fire and bilge pumps are fitted, all of which can be tied into the Grinnell sprinkling system if necessary.

The elaborate ship's lighting was entirely designed and installed by John Duck & Sons Ltd. of Vancouver, B.C. Loud Hail P.A. system was by Barwick Engineering Co. Mariners Pathfinder radar. GE ship to shore telephone system—2 complete units, one for public and one for ship's officers and navigation.

Photographs by George N. Y. Simpson, Victoria, B.C.



The *Tanana*, owned by the Alaska Railroad, under way with a tow.

TWIN DIESEL TUGS FOR YUKON RIVER

Albina Engine and Enterprise Team Up For Unique Job

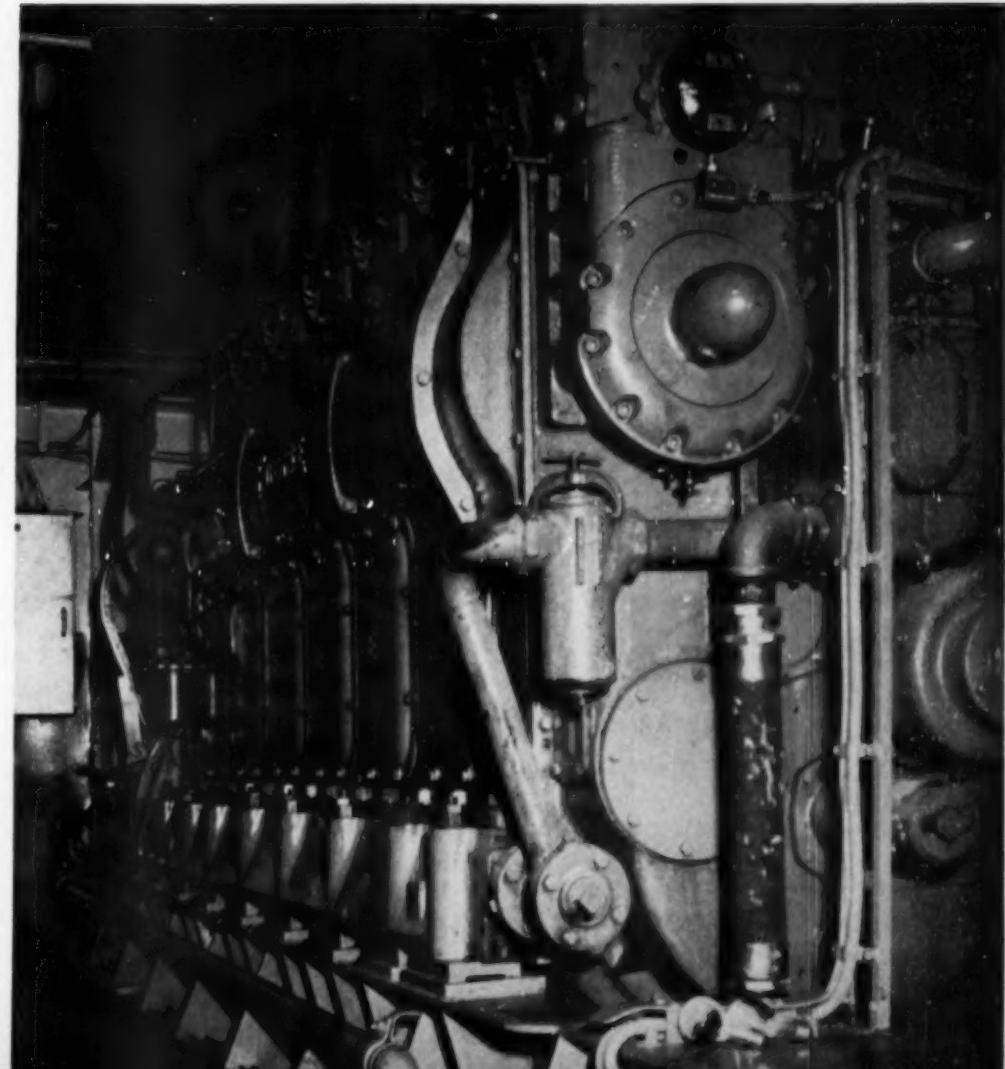
By CHAS. F. A. MANN

AS America develops its vast empire in North Central Alaska, transportation plays a growing role on every front—air, highway, railroad and river. Transportation in Alaska in the past 6 to 8 years has gone heavily to diesel, despite the reluctance of Alaska Railroad to break with so-called "cheap" Alaska coal.

Late in May the Alaska Railroad accepted delivery at Albina Engine & Machine Works, Portland of two unique 1,200 hp. diesel tugs, each paired with a novel designed 300,000 shallow draft river gasoline barge, and had them towed from the builder's docks on the Willamette River to the Bering Sea thence under their own power where they arrived late in June at the mouth of the Yukon, thence under their own power for more than 1,000 miles upriver to the Tanana River north of Fairbanks.

Both tugs and both barges are identical all-welded, shallow draft steel vessels, as near fireproof and as durably constructed and equipped as the designer, builder and equipment people could make them. They will operate in conjunction with the new Alaska Railroad oil terminal on the Tanana River, and will operate 200 miles on the Tanana River; 800 miles downstream on the Yukon to the great airfield at Marshall, in the heart of West Central Alaska and upriver to Ft. Yukon another 200 miles. River conditions on the Tanana limit loaded draft

One of the main Enterprise diesels powering both the *Tanana* and *Yukon*.





to 3½ ft. so full cargoes will only be carried below the mouth of the Tanana in the main Yukon, during the open season from April-May and October-November.

The tugs, named *Yukon* and *Tanana*, are identical and were designed in collaboration between L. R. Hussa, Albina President, and architects Robert A. Smith and P. C. Mitchell, the latter a river architect at Pasco, Washington. Each have the following principal dimensions: Length, 120 ft.; depth, 7 ft. 6 in.; beam, moulded, 35 ft.

They are built to Class A1 for river towing and carry fuel for a 20 day cruising radius with barges loaded to 4 ft. 7 in. maximum load line in the Yukon River. Design features include 4 flanking and 2 main rudders with fast hydraulic pilot house controls; river water conditioning systems; tunnel sterns with deck wells so propellers can be changed out without docking or beaching the tugs; elaborate living accommodations including 11 staterooms for 12 and 5 double staterooms for a total of 10 crew members, or beds for 22; heavily screened and ventilated quarters and sleek matching oil barges that can literally skim over Yukon river sandbars with full load.

Main propulsion consists of two Enterprise Model DMG-16 diesels, each with 12 in. bore and 15 inch stroke, rated at 600 hp. at 600 rpm. These engines are equipped for full remote control from the pilot house, so sensitive that they can go from full ahead to full reverse in less than 30 seconds. Each diesel

swings a 52 x 34 inch 3 bladed propeller, with Goodrich Cutless rubber stern bearing and steel lineshafts, with propellers operating almost entirely enclosed in stern tunnels. Enterprise hydraulic control system will be particularly valuable in conjunction with the fast lever-controlled hydraulic steering system built by Markey of Seattle, which provides dual rams and dual pumps for meeting all emergencies.

Auxiliary power is provided on each tug by two Buda Model DCM 75A3 75 kw. 400 volt ac. generating sets furnishing all cargo pumps and electric auxiliary current. Barge pumps are motor driven from cable supply from the tug. All pumps on the tugs are Fairbanks Morse.

Cooling of the main engines and the auxiliary will be by an enclosed skin cooling system built on the inside of the hull, and controlled by automatic thermostatic valves. River water is run through a DeLaval centrifuge to remove sand; then through a Hygeia water filter and finally through a Wilson Hypo chlorinator. Deck machinery is all by Markey Machinery Co. of Seattle, consisting of a type DES 10 electric deck winch; two type CEV 50 electric warping capstans and two type C-4 hand capstans. Weston Tachometers are fitted, as well as Raytheon Fathometers. Each ship carries twin searchlights and twin stacks, each with Maxim silencers for both main and auxiliary diesels. Each tug carries 40,000 gallons of fuel oil; 500 gallons of lube and a reserve capacity of 650 gallons of prepared river water. The galleys are of the most

modern type with large electric refrigeration, electric galley ranges. All quarters are ventilated with Modine fans.

A Quincy air compressor, equipped for operating with either a motor or a small standby gas engine for use when starting cold, with air bottles empty. Kefratt aluminum sash with screens and aluminum doors made by Hendie-Ryan of Portland keep warm river summer air moving and the big fat Yukon mosquitoes out!

The twin barges are 175 x 44 x 7½ ft. maximum draft and carry 300,000 gallons loaded. Each has 8 compartments and a single main 6 inch F-M Pomona oil pump with 30 hp. motor. A 35 gpm. Blackmer stripping pump is fitted on each barge. Power supply from the 440 volt ac. system is provided by cable.

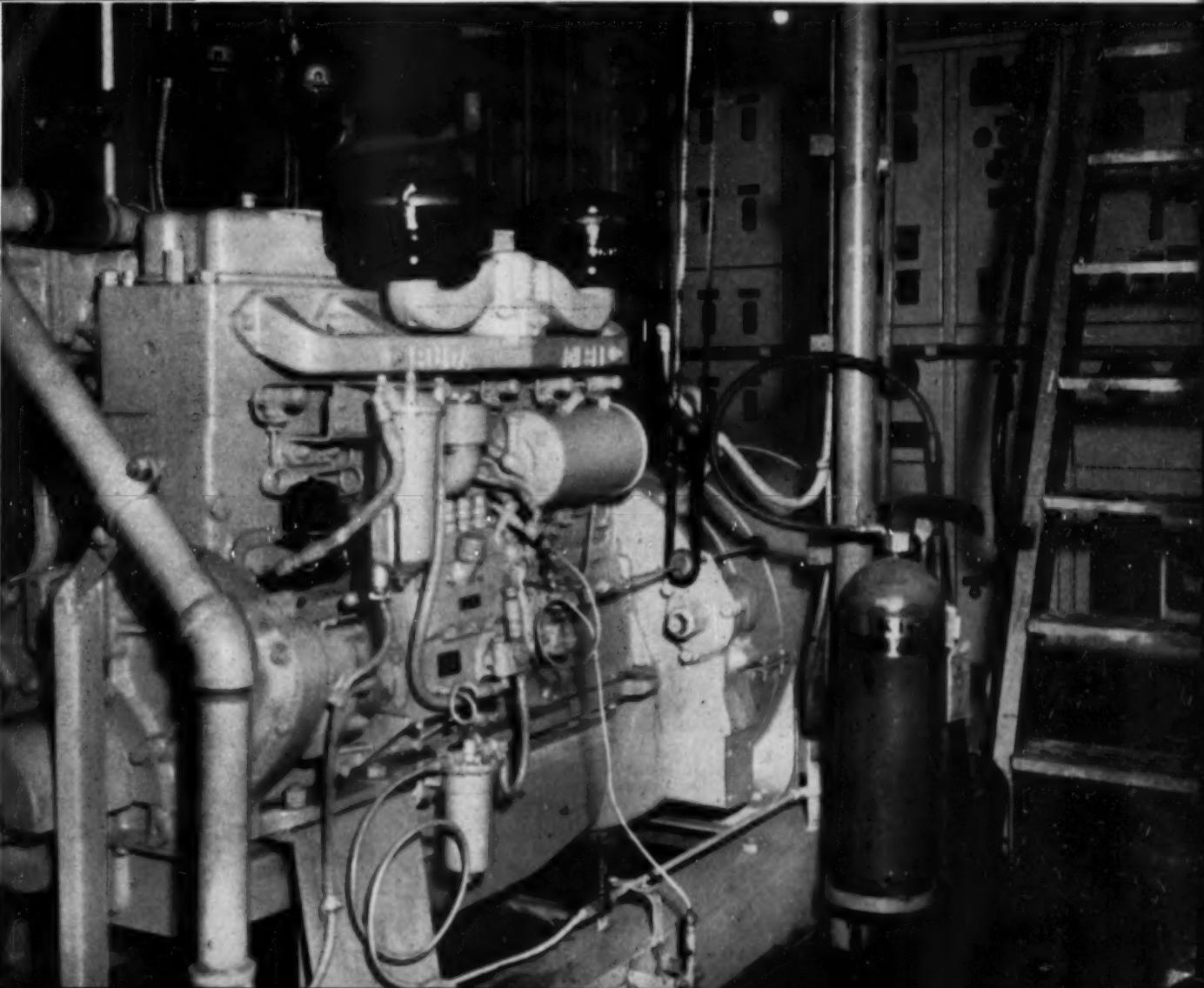
The tugs left Portland in two separate tows. One pair was handled by the Upper Columbia Towing Co.'s diesel tug *Quinnett*, Capt. Sam Geer, master, with three youthful guests, Bob Leppalusto, 13, son of Capt. A. Leppalusto, general manager and principal owner of the firm; and his two guests, Murvel Geer, son of Capt. Geer and Dick Boyle, 14, son of Capt. O. Boyle of Upper Columbia River fame. Capt. and Mrs. William E. Maki of Portland were on the *Yukon* for the trip north. And Capt. and Mrs. Howard Adams of Seattle were on the *Tanana* for the north trip. The Kodiak-Aleutian Salvage Co.'s diesel tug *Aleutian Salvor* towed the other Yukon tug and barge, with Capt. H. A. Mitchell in charge.



Stern view of the *Tanana*'s sister ship, the *Yukon*.

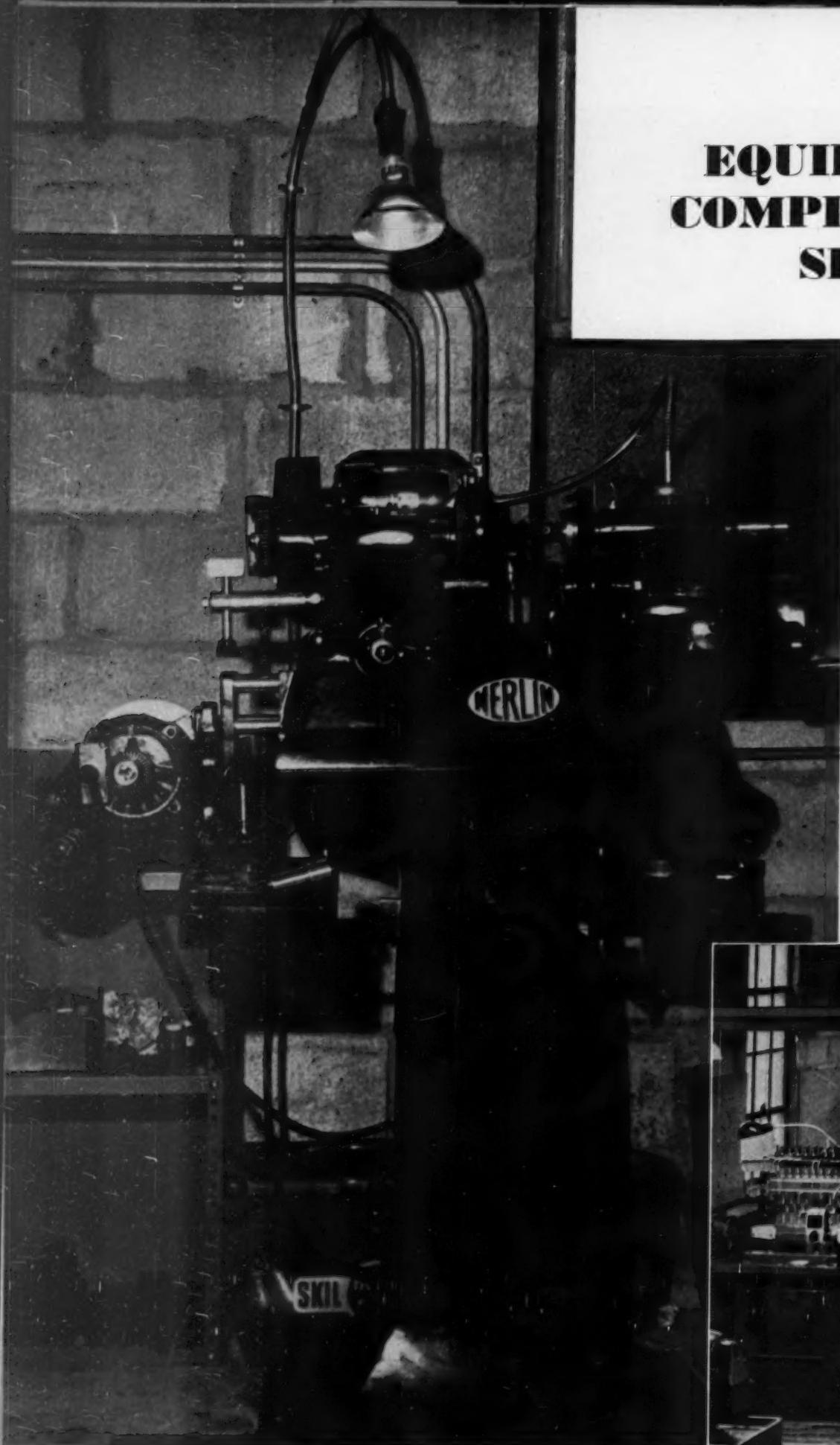


The pilot house of the *Yukon*. Note the clean, simple arrangement of the instruments.



Both the *Tanana* and *Yukon* feature Buda auxiliary diesels.

EQUIPPING FOR COMPLETE DIESEL SERVICE



First Merlin Servicemaster installed in America, seen in the shop of A & D Diesel Service, Inc. This precision grinding and lapping machine is used to restore worn parts of fuel injection equipment.

Partial view of the A & D Diesel Service shop indicating the wide range of testing and servicing equipment installed.

THE first company in America to purchase and install the English manufactured Merlin Servicemaster, (they saw it advertised in DIESEL PROGRESS), is A & D Diesel Service, Inc., Brooklyn, N. Y. This progressive and fast-growing concern aims to render complete and fast service to diesel users and to save them the extra cost of new parts wherever it is possible to restore old parts through the use of adequate equipment. To carry out this program the company needed a reliable precision grinding and lapping machine capable of handling all types of fuel injection parts and they recognized such a machine in the Servicemaster.

Upon installing one of these machines they found that it not only incorporates complete equipment for the reconditioning of fuel injectors but it also is adaptable for precision grinding of a wide range of parts that fall within its physical capacity. The following partial list gives an idea of the Servicemaster's versatility: it grinds and laps plug gages, automotive universal couplings, steel sleeves and bushings, ball races, disc and plate valves for fuel pumps, valve tappets, forming tools, etc.

Here are the manufacturer's moderate statements regarding this useful machine: Injector Service.



The Servicemaster is a machine tool which incorporates complete equipment for the reconditioning of all types of compression ignition engine injectors. Injector re-conditioning is not a long procedure, nor are very highly skilled men required. Most types of injectors are brought back into new condition within the space of a few minutes.

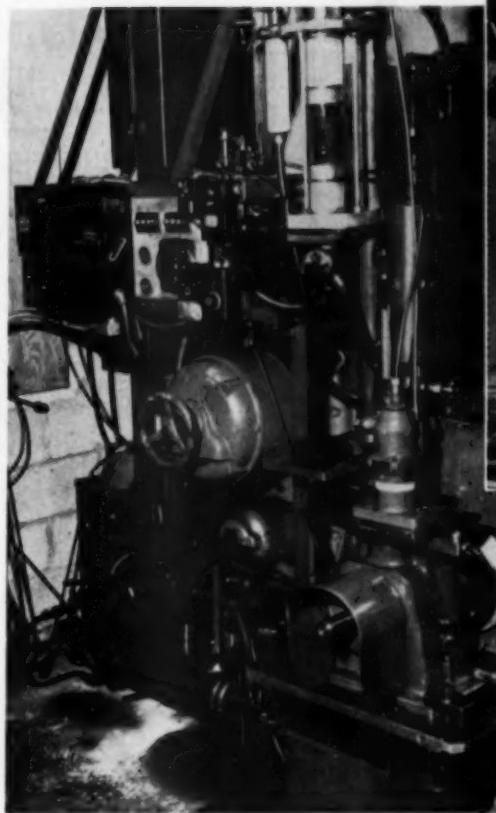
Standard equipment supplied with the machine enables the following operations to be carried out on injectors: 1. Injector needle regrinding at angles variable between 52° and 68° to an accuracy of plus or minus one minute. 2. Lap grinding to a similar degree of accuracy and range. 3. Nozzle seat lapping using laps ground to angle on the machine. 4. Flat lapping for instance flat nozzle seats and nozzle and faces. The above operations are those normally employed on injector service.

For rectifying large nozzles with extra large needles or needles having two seating angles such as marine types, a wider range of angle adjustment is required and additional equipment can be supplied to cover all angles encountered in service. Special fittings to handle American or Continental equipment can be supplied in instances where this is necessary.

Grinding—In the four jaw chuck cylindrical and taper grinding may be performed up to angles of approximately 20° inclusive. Centreless grinding in the vee-blocks other than needle grinding. Free-hand grinding at the second wheel on right hand side of wheel head where tool rests of both flat and vee type are provided.

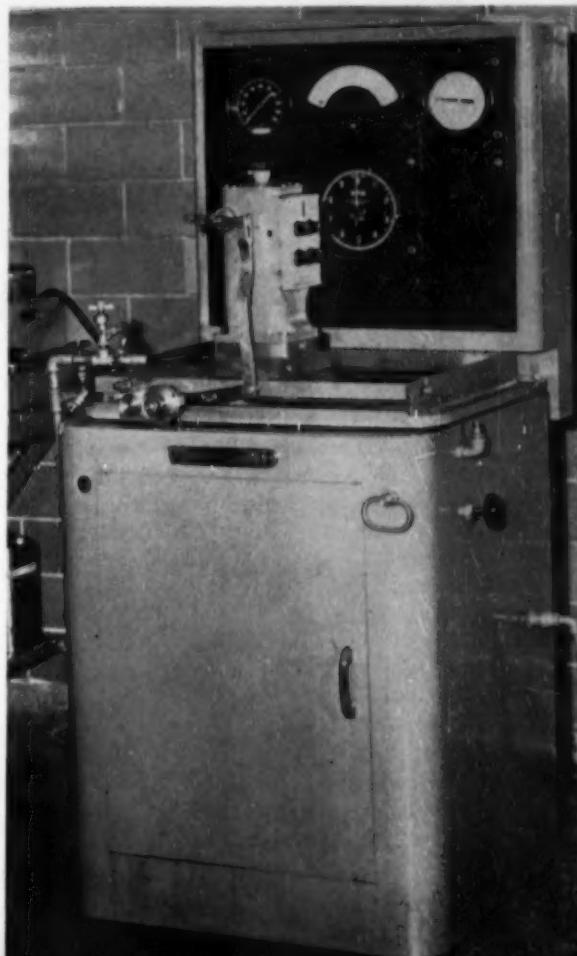
Valve Refacing—By removal of the needle grinding attachment (3 minutes) the machine is instantly

Test stand developed by Robert Bosch is used for timing and calibrating multi-cylinder fuel injection pumps.



Fuel pump testing and calibrating stand which handles various types of individual fuel pumps.

This governor test stand is the first of its kind and was developed by Woodward Governor Company. All makes of hydraulic governors are overhauled and tested according to factory methods and specifications.



converted into an automobile-valve refacer which will cope with valves having stems up to $\frac{5}{8}$ in. (15½ mm.) in diameter. The revolving head is provided with a graduated scale to allow setting up to a specific angle.

Wet grinding—The machine is fitted with full wet grinding equipment to the right hand wheel. This comprises a gear pump driven from the main motor with suitable suds tray, sump, etc.

Wheel dressing—A fixture, permanently built into the machine allows the grinding wheel to be diamond dressed true to the slides expeditiously. Where auxiliary equipment is brought into use, as for instance the Marine Attachment, a diamond dressing forms part of such equipment.

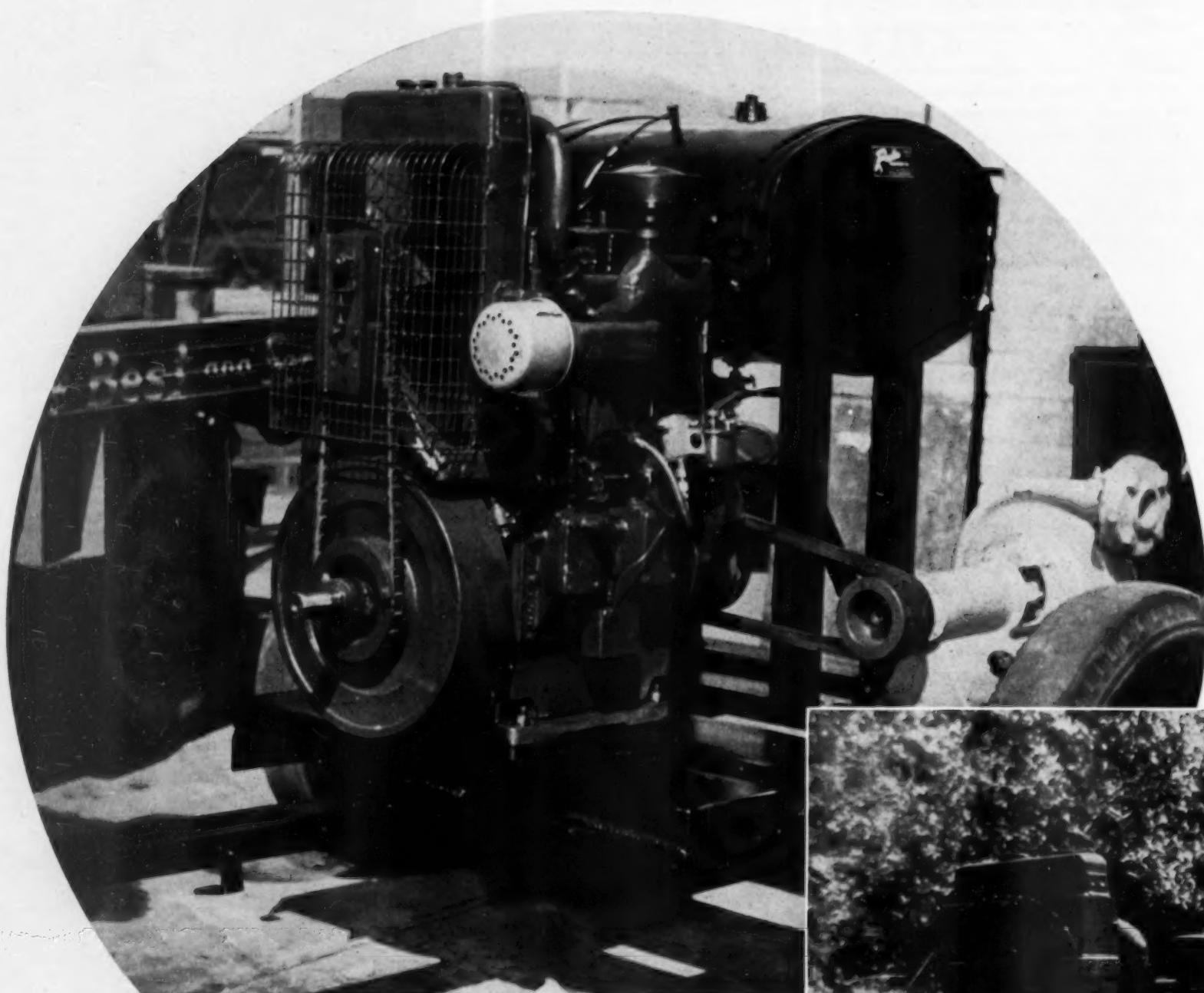
Another first in this shop is the governor test stand recently developed by Woodward Governor Company. In use, this machine mounts any make of hydraulic governor and simulates typical engine operating conditions for testing and calibrating the governor.

A & D Diesel Service, Inc. is a progressive and fast-growing organization. The company was founded in 1945 by Vincent D'Aversa. Associated with him as Sales Manager is W. L. Fetherston and the combined experience of these men totals more than 25 years in the field of diesel fuel injection operation, service and maintenance.



HANDS ACROSS AND BACK AGAIN

By F. HAL HIGGINS



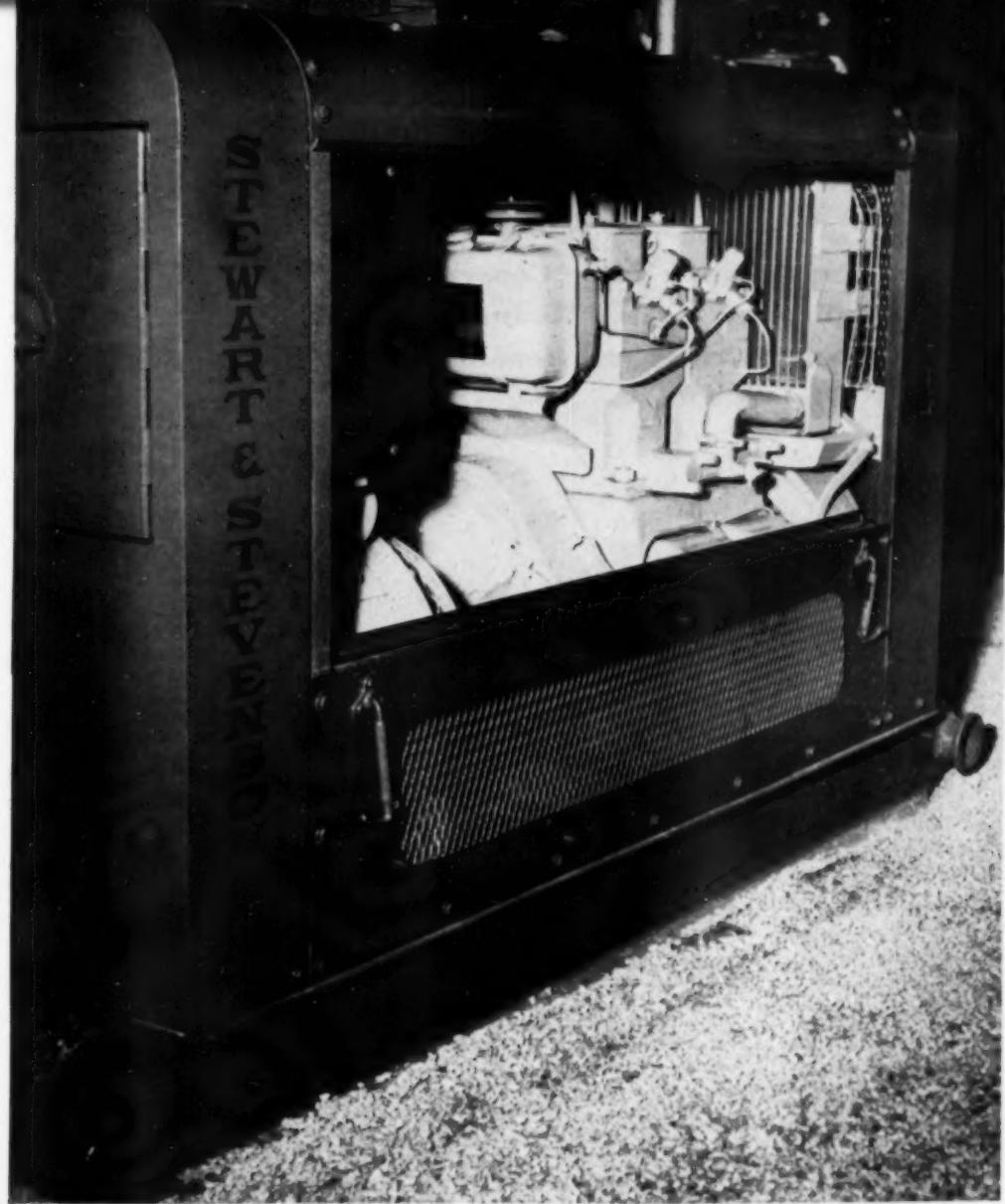
Portable Petter AV2 driving a Berkeley pump as assembled and mounted by Rankin Equipment Co., Yakima, Washington. Used for irrigation of the famous apple orchards in the area.

BRUSH ABOE, Inc., vice-president, David W. Mansell, was on the West Coast covering the territory for his company late in May and early June this year. Your Old Reporter just happened to drop a copy of his report to DIESEL PROGRESS on the desk of ABOE's San Francisco distributor on the day Mr. Mansell called on this representative. Hence, the phone call from the ABOE official and the breakfast interview in San Francisco the next day to get the story of this "British invasion" of the U.S. The writer is a firm believer in this kind of competition to bring new ideas, products and engineering to the public. It is one of the freshest notes we have in the auto industry at this time, and is doing much to stimulate inter-

est in the technical skills on both sides of the Atlantic in both engine and the machines they power.

This ABOE vice-president was a pleasant surprise at first sight and gave the writer the answer at first glance as to why this British firm was going places in introducing its small diesels to open up virgin markets ripe and waiting to be harvested. He admitted to an age of 28 and looked even younger with the direct and accurate on-target approach to the problems of surveying the fields and territory for his product. His distributors, already chosen, also rate the product and ABOE organization in the big league class sure.





▲ 5 kw. drill rig power unit as built by Stewart & Stevenson Service, Houston, Texas. The diesel is a Petter AV2.



◀ A Petter diesel installation in the Northwest where some 250 have been sold and serviced by 26 dealers.

"You will note we use the name Brush ABOE, Inc. Reason, the founder was Charles Brush of Cleveland, Ohio, so that we are a sort of hand-across-and-back-again organization today after some 80 years. Some of our engines go back over a century through gasoline and steam, of course. This trip out to the West Coast from my New York office is a regular coverage of the territory. We have in the past four years got well established in the United States with distributors located in the strategic cities for sales and service. Up at Seattle we are represented by Motor Parts Machine Co., which has 26 dealers in Oregon and Washington. They have sold about 250 Petter engines to date, mostly for sprinkler irrigation and marine auxiliaries. Here in Berkeley, California, West Coast Engine & Equipment Co. with territory covering northern California and northern Nevada has 10 dealers. Marine auxiliary installations have been the main sales here. At Los Angeles, the Caterpillar dealer, Shephard Tractor

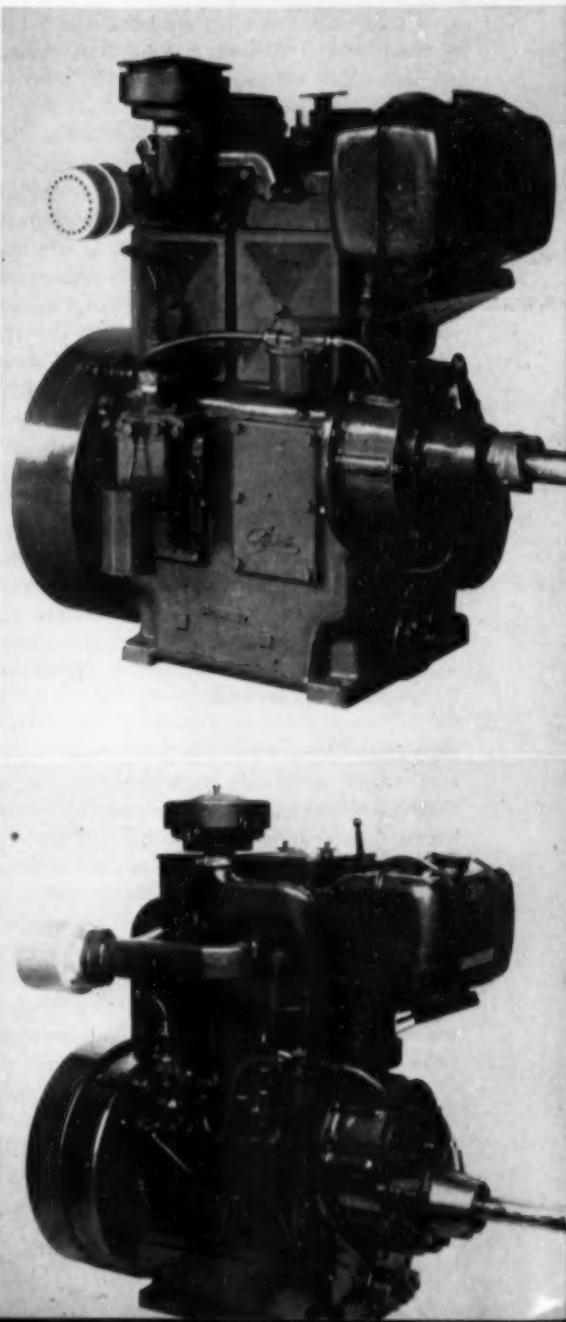
Vertical twin cylinder, 4-stroke cycle Petter diesel. Power rating is 6-10½ bhp. at 1000 rpm.

Co., is the distributor through its several branches covering the greater Los Angeles area. Some 50 to 70 installations have been sold to date. The same is true about the outlet in the San Francisco distributor's territory.

"Some trends I note are: Popularity of air cooled engines, which is the coming thing. You will see it in larger engines soon. In the marine field, there is a big swing to small diesel engines for refrigeration on the fishing boats. It keeps the catch fresh to permit longer trips from harbors with more time and distance on each trip for economical fishing trips, of course.

"One thing that has been a big factor in our success is the ability to supply parts from our large stocks in this country to eliminate any possibility of having to wait for parts from the other side of the Atlantic. Each of our districts carries handsome stocks of parts for all models. The buyer never has to go to England for parts, as we see that each District Manager is supplied with enough parts to meet any demand."

The AV2C Petter diesel-driven air compressor. Free air delivered 8 cfm. intermittently), 15 cfm. (continuous at 100/350 lb./sq. in. pressure.



THE FREE PISTON GAS TURBINE

Pipelines Across The Country May Conserve Millions of Feet of Natural Gas and Reduce Its Cost to The Consumer, Saving Our Resources for The Future

UNDER wraps for several years, Cooper-Bessemer's development work on the free piston engine driving a gas turbine is rapidly approaching what designers believe to be the most practical solution to a heavy-duty gas turbine-type prime mover, yet one offering the unmatched high efficiency found only in the finest diesels today. The research and development work has been under the direction of Ralph L. Boyer, vice president and chief engineer, and Robert P. Ramsey, consulting engineer. Being unusually small, simple and compact, the free piston engine turbine requires less space than needed by other prime movers. It can be installed at much lower cost per hp., requires less expenses to maintain and supervise.

High operating efficiency, which means low fuel consumption, is one of the free piston engine turbine's greatest advantages over the conventional gas turbine. According to Cooper-Bessemer development engineers, efficiencies as high as 40% are possible with their unit, compared to commercial attainment of efficiencies in the 25% range in conventional gas turbines of today. Actually the free piston engine turbine produces power with about half the fuel needed in many conventional gas turbines. This depends upon the relative efficiencies.

Many European gas turbines of the conventional type are in use at around 20% efficiency, as are certain railroad gas turbines in this country. The free piston turbine does its work at temperatures within the range of proven steam turbine practice. This means that Cooper-Bessemer's turbines can be built without the need for "supersuper alloys" which have been a major problem to the aircraft jet designers for many years.

Successfully combining the operating characteristics long sought in driving high speed machinery, Cooper-Bessemer engineers foresee their free piston engine turbine development as the first practical approach to relieving rising costs of fuel and labor. Now for the first time, industry will have the benefits of smooth rotary turbine power yet with the fuel economy of the finest diesels and modern gas engines. And with the free piston engine turbine, these efficiencies will remain at high level regardless of variations in load. In the conventional gas turbine efficiency drops off drastically as loads are reduced. The gas turbine itself is, of course, nothing new in the power field. Gas turbines have been in use on jet aircraft for many years. Commercially over 49,000 horsepower is already installed or sched-

uled in this country's electric generating plants. Many thousands of horsepower are in other uses and in turbosuperchargers. In foreign countries the total exceeds 245,000 horsepower.

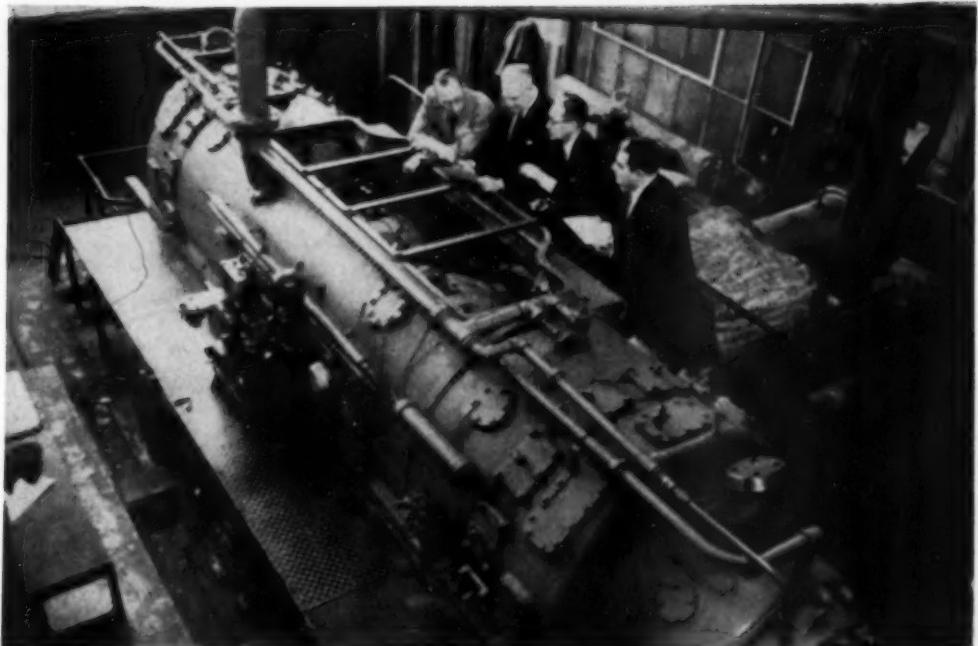
The basic difference between existing gas turbines and Cooper-Bessemer's development is in the method used to supply the turbine with heat energy for conversion through rotary power. In the conventional gas turbine, air for combustion is compressed by a rotary type blower. This blower or compressor is driven from the shaft of the gas turbine itself. After the air is compressed, the fuel is burned in a low pressure combustion chamber between the compressor and the turbine. This heat increases the temperature of the air expanding it to propel the turbine. Since power to drive the compressor is taken out of the turbine itself, the output of the turbine is reduced accordingly, and the more horsepower needed to drive the compressor, the less power remains for useful work. With the Cooper-Bessemer development, the free piston engine replaces both the rotary compressor and the low pressure combustors supplying hot gas under pressure to the gas turbine. The free piston engine furnishes its own high pressure efficient combustion chamber within the engine's power cylinder.

The free piston engine is a basically simple opposed piston internal combustion engine without a crankshaft or connecting rods. The work of many pistons in the ordinary internal combustion engine is handled by just two pistons which directly oppose each other in a single cylinder. Fuel is ignited in the space between the two power pistons. The burning gases force them apart to actuate compressor pistons directly attached to them. As the piston assemblies reciprocate, air pumped by the compressor pistons is directed through the combustion cylinder. This air cleans out or scavenges the hot gases of combustion in the cylinder and drives them through a pipe to propel the blades of the turbine motor. The cycling of the air through the free piston engine's cylinder keeps it cool and lowers the temperature of the gases going to the turbine. The combustion taking place at high temperature and pressure in the water cooled cylinder permits the free piston engine turbine to operate with a high overall efficiency on exhaust gas discharged at 1000°, after it has been expanded partially to compress its own air. This is in contrast to the high temperatures required to gain relatively inefficient operation of most conventional gas turbines at around 1350° to 1500° at the present time.

One great advantage of operating as low as 1000°, explain Cooper-Bessemer engineers Ralph Boyer and Robert Ramsey, is that the turbine can be manufactured with materials normally available for civilian use and that can be easily manufactured. The higher temperature alloys needed for other types of gas turbines are still and probably will remain on priority lists for a long time, for jet engines and other aircraft or special usages. The "creep" characteristics of high temperature materials stressed under high speeds and at high temperatures is a problem that has confronted metallurgists for many years.

Combustion in the free piston engines takes place at very high pressures and temperatures and the full expansion work is taken out of the cycle. Combustion in a conventional turbine takes place at much lower pressures, but at very high temperatures and a great deal of the energy is wasted out the exhaust. The free piston has its own compressor and combustor and the conventional turbine must drive its own rotary compressor. In a simple cycle gas turbine, producing, for instance, 5000 net horsepower at the output shaft, actually about 15,000 horsepower must be developed by the turbine's rotor. Approximately 10,000 hp. has to be taken out of this 15,000 hp. to drive its own compressor. Many devices have been developed to boost more efficiency from the conventional rotary compressor type of gas turbine. Some machines recover waste heat from the turbine exhaust to help heat the air going into combustors. The heat from the exhaust supplements fuel burned in the firing chamber through what is called a regenerator. The free piston engines does not need a regenerator because it uses the exhaust energy in the turbine itself. When compound turbines are used to gain pressure and efficiency, it is necessary to use intercoolers between compressors, thus burdening the continuous combustion gas turbine with another expensive device. The free piston requires no intercooling.

Another procedure in some continuous combustion turbines is to reheat the gases after passing through one turbine before they go through another. This requires an additional combustion chamber and, in fact, amounts to another complete turbine plant. The free piston requires no reheat procedure. It is possible, of course, to burn extra fuel in the exhaust line before the gases from the free piston engine reach the turbine in order to gain high overload capacity. These devices do increase the



View of the Cooper-Bessemer gas generator-turbine hook-up on the test floor. Pictured, from left to right, are Mr. R. L. Boyer, chief engineer; Mr. R. P. Ramsey, project engineer; Mr. D. A. Klinger and Mr. W. A. Moraine of Cooper-Bessemer's engineering experimental department.

efficiency of the continuous combustion turbine, but at a costly price in the extra equipment that must be installed. A point is reached where diminishing returns limit the use of expensive equipment. Even with all of these trimmings, the best efficiency attainable today with commercial continuous combustion turbines is still low as compared with the possible 40% of the free piston engine-turbine combination. Aside from the matter of efficiency, the free piston gas turbine promises great additional power outputs through supercharging.

Even if the problem of efficiency could be remedied, another roadblock faces the rotary compressor type of gas turbine and that is the inability of the machine to maintain high efficiencies with changes in load. Other complicated devices are possible and are in operation, but the free piston needs none of these. Whether the compressor is centrifugal or of the more costly axial flow type, the range of operation at high efficiency is limited in the continuous combustion turbine. The statement is frequently heard that with the advent of commercial high temperature turbine materials, high efficiencies will be obtained from simple, inexpensive continuous combustion turbines. As a matter of fact, the increase of temperature alone will account for only a small increase in efficiencies above the present operating level and these rotary compressor type turbines will have to resort to further improvements in the devices salvaging heat losses in order to improve their performance.

The advent of higher temperature materials will not affect the economics of the free piston engine which utilizes 1000° materials. Since the free piston engine driving the gas turbine is so promising, why hasn't it been perfected before this time? The principle has been known to power engineers for a long time. The practical usage began in small compressor units developed in Europe during World War II in submarines for supplying high pressure air to discharge torpedoes. The Navy has been in-

terested in the cycle for a long time, but has not put forth the kind of effort found in aircraft development because of the lack of extreme urgency and the requirement to apply most of the talent towards the pressing matter of aircraft jets. To this time, however, no company in this country has tackled the development of heavy duty commercial units big enough to handle large machinery and ship propulsion. Alert for some time to a need for efficient turbine machinery, Cooper-Bessemer undertook as part of its overall developmental program a project to investigate the free piston engine. While the engineering time and cost have been very substantial, Cooper-Bessemer feels its long range planning is going to pay off in fulfilling needs in the power fields that the company now serves.

The gas turbine has always been attractive to power users because of its promise as a compact simple unit. Cooper-Bessemer feels that now with the free piston engine, this objective can be reached. Free of vibration, the free piston engine needs but a fraction of the foundation size of conventional prime movers. Its basic requirement is as much as 30 to 60% less than others. From what is already known about the free piston engine turbine, Cooper-Bessemer feels their development will accelerate preference for gas turbines in central station operation as well as in general industrial power. While present plans call for power generating units having capacity from 5000 to 15,000 kw., in all probability the time will come when larger sizes of free piston engines are developed.

Being a simple self-propelled prime mover, the free piston engine adapts itself to gas turbines of practically any size. A number of free piston engines can be grouped as gas generators driving a single gas turbine. One or more of these free piston engines can be added or cut out of a line for meeting varying load requirements. Power generating stations in water-hungry areas of the country will

be helped by the simpler cooling in free piston engines. Embodying the same conventional water-jacket cooling of internal combustion engines, cooling on the free piston engine turbine is done with a closed system using fans and radiators. As a result little make up water is needed.

In powering vessels, Cooper-Bessemer forecasts a promising future for the gas turbine driven by the free piston engine. As fuel costs, cargo carrying capacity and cruising range become more critical, greater stress will be placed on operating efficiency than exists now in the minds of shipowners. In foreign built vessels, the ratio of diesel to steam turbine power is about 1 to 1. This results from the relative importance of fuel costs to labor costs abroad. In this country the ratio of diesel to steam is 1 to 30. The ratio, C-B officials predict, will increase in favor of diesel fueled prime movers, such as their free piston engine turbine. In military equipment, higher efficiency means greater cruising range. In addition, the free piston turbine unit provides an increase in cargo carrying capacity by eliminating the need for space-consuming boilers.

The free piston engine turbine naturally develops a smooth, highly responsive turbine drive for ship propulsion, yet offers the naval architect a simpler unit to install and one which is free of vibration. Its low center of gravity and easy ship accessibility for maintenance are particularly desirable to ship owners. Rapid response to maneuverability desirable on shipboard but presently available only in diesel powered equipment is retained in the free piston engine driven gas turbine. Developing the same great reserve of power as steam units, Cooper-Bessemer's gas turbine, however, eliminates the time lag of loading up boilers.

A limited number of conventional gas turbines are already in use on railroads both in this country and abroad. While these gas turbines are performing to expectations, their efficiencies fall far short of what can be attained with ordinary diesel engines. Combining the fuel efficiency of the diesel with the advantages of turbine drives, Cooper-Bessemer engineers foresee their turbine on locomotive service, probably without electric drive.

While Cooper-Bessemer engineers Boyer and Ramsey view their new development with optimism, they caution that there is still much to be done by way of field testing before the units will be actually released for production. The free piston engine embodies no new problems in production to Cooper-Bessemer. As far as gas turbines are concerned, Cooper-Bessemer has been building exhaust-driven superchargers for many years and the long experience in that field has already provided a background for this type of application where the power turbine is nothing more than a large supercharger taking all of the exhaust gas and converting it into the useful work, rather than taking it out of the crankshaft as has been the ordinary practice.

Until variables are fully solved, Cooper-Bessemer cautiously restrains final release on its free piston engine driven turbine and when all of the answers have been service proven, the designs will be confirmed for manufacture and sale to industry.

FLORIDA OIL

Diesels Drive Drilling Equipment on New Test Well at Key Largo

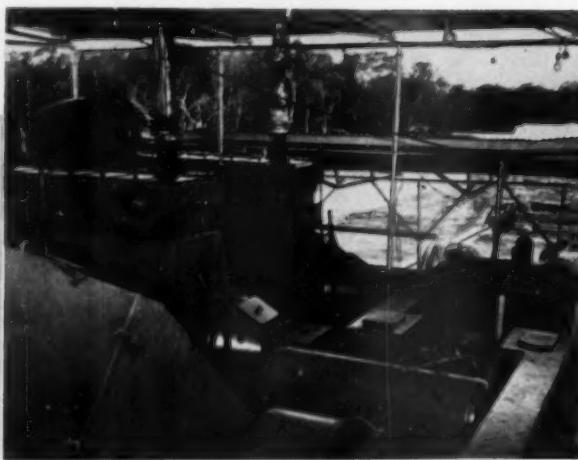
By ED DENNIS



Left to right: W. F. Conley, drilling superintendent for Harry Morgan Co., Shreveport, La., drilling contractors and Tom Howard, driller at the controls of the Ideal Consolidated drilling rig.

ILL for the lamps of Florida is what we Floridians are hoping for at the new test well down at Key Largo, and diesels are helping to make our dreams come true. Sinclair's latest oil well drilling rig at Key Largo, sixty miles south of Miami, is being watched by oil men from all the oil centers in the country, for, depending on Sinclair's and Commonwealth's (partners in this well) luck and upon reports of the geophysical crews depends the future payments of oil funds in South Florida.

P. C. Spencer, president of Sinclair Oil and Gas Co., predicted a new economic frontier for South Florida if his firm should strike oil at Key Largo. In 1952 the oil industry pumped almost \$13,500,000 in cash into Florida's economic veins and is ready to spend another ten million dollars in 1953. Altogether the 17 oil producers have 17,481,950 acres under lease; nearly half of the total acreage in Florida, at an estimated annual rental of \$5,789,170. The tension will mount until the drill bit reaches about 10 to 11 thousand feet. "Then I'll know if I have another dry hole," said J. L. McCord, executive vice president of Commonwealth Oil Co.



Two of the three Model PTD Superior diesels each rated at 280 hp. Notice the Woods clutches and the Twin Disc power take-off at the end of each shaft.

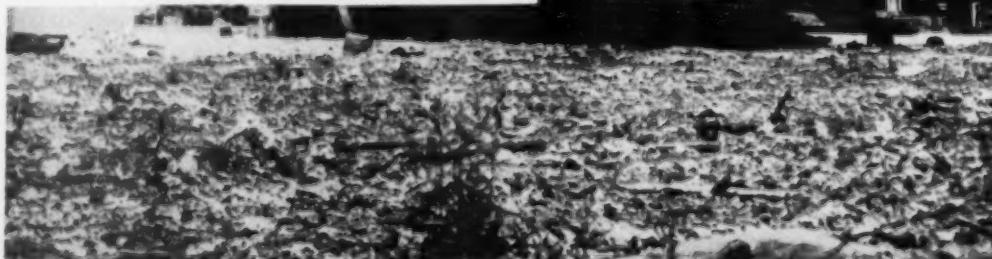
Most of the equipment was made and furnished by National Supply Co. Power is supplied by three 6-cylinder model PTD Superior diesel engines each rated at 280 hp. with a Woods clutch and Twin Disc power take off at the end of the shafts. In between the clutch and the power take off is a National Supply Co. chain drive which can be used to work any two engines and isolate the third one. Also to supply energy for the Ideal power driven slush pumps. Power for a General Electric 10 kw. generator is secured from engine #1 by means of pulleys and belts.

Water is forced into the hole and the rock and water are forced out by huge pumps. The three Superior diesel engines supply all the necessary power for the whole outfit. The samples are examined for oil bearing formation. The estimated drilling speed for the drill bit was about a foot in an hour and a half as the rock formation at 8,628 ft. was as hard as flint, reported Tom Howard, the driller.

List of Equipment

Engines—Three Model PTD Superior diesels. National Supply Co.
Air Compressors—Gardner-Denver, Curtis, Westinghouse.
Pumps—Gasco.
Clutches—Woods.
Power Take-offs—Twin Disc.
Drilling Rig—Ideal Consolidated. National Supply.

Drilling rig of Harry R. Morgan Co. contractors for Sinclair and Commonwealth Oil Companies. It is approximately 136 ft. high and took 4 days to erect and 5 days to get ready to drill. It is an Ideal Consolidated rig. National Supply Co.



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CRANKWEBS--INCLUDING ARCWELL DESIGN

By S. W. NEWELL

A principal objective of this paper is to bring together some data descriptive of certain types of crankshafts. It is possible that here may be found a few thought provoking suggestions and developments. It is hoped that further worthwhile developments may result at least in part herefrom. This paper presents a bit of practical knowledge based more on shop experience rather than on intricate mathematical hypotheses. It shows how a desirable design objective was developed through an intimate knowledge of manufacturing techniques, problems and capabilities. Such approaches are not always possible, but when they are, they sometimes lead to very practical solutions. Often it appears as though the average mechanical engineer is limited in his capabilities not for want of better technical engineering training as much as for want of more extensive practical mechanical background.

The origin of the words crank and crankshaft is somewhat obscured but is probably connected with a root meaning "crooked." Nevertheless, it is an historical mechanical device by which reciprocating motion has long been converted into circular motion. Fundamentally, any crankshaft is composed of one or more elemental cranks or throws. Each crank consists of a crankarm, one end of which is rigidly fastened at right angles to the rotating shaft or axis; while the other end has projecting from it at right angles and parallel to the axis the crankpin. In modern practice and terminology each crank usually consists of structural components known as crankwebs; portions of rotating shaft or axis form main bearing journals; crankpin is usually supported by a crankweb on each side although projecting crankpins are used in some special applications. All components continue to perform their historic functions, their forms and names having been changed only to make them efficient or to more clearly portray their functions.

The fields of crankshaft applications are very broad. Simple, small cranks were formerly supplied with each new automobile. Even though that crank has been done away with, the power developed in the cylinders of our automobiles is still translated from reciprocating pistons to rotating wheels through a crankshaft. Perhaps these modern automotive crankshafts are the most highly developed and most interesting of all. Surely great amounts of research have been spent in developing and determining their design. Even greater sums have been expended in preparing and tooling them for production. All of this is justified by the great demand for such parts. It typifies our way of life and forcefully shows much about how it has been attained and indicates how it is retained. However, this paper concerns itself primarily with larger crankshafts which are not demanded in great quantity but which must also be of unexcelled quality. Each is a major component of its end product which must successfully compete in the global market. Hundreds or even thousands of man-hours are

required to manufacture each of these larger crankshafts. With existing disparities in man-hour rates throughout the world it is self-evident that never ceasing vigilance must be maintained to make certain that our designs are most effective and our production techniques most efficient. Like most other things which are worthwhile, this is an endless task of monumental proportions. It must be accomplished if these end products of ours are to be both desired by and within the purchasing power of all.

These larger crankshafts are machined on all surfaces, must be carefully balanced and are finished to precise limits. They are used primarily in larger internal combustion engines. Each is made individually. Mass production methods are little used because of relatively high investment demands of appropriate tooling and limited demand. Seldom are such crankshafts made on tools other than those of a general purpose nature. Occasionally production may warrant investment in special crankturners or millers, but usually crankpins, crankwebs, and main bearing journals are machined on large engine lathes adapted for this type of work.

With only a few notable exceptions, crankshafts of this type are made from hammered steel forgings. Original ingots must be large. Various regulatory bodies have established requirements for minimum acceptable area reduction ratios. Forged cross sectional areas are not permitted to exceed from one-fifth to one-third of the area of the original ingot. Experience has shown that this forge working as

well as proper physical tests in forms of tensile and bend bars is essential to assure satisfactory results. Customarily, a crankshaft forging is approximately twice as heavy as is its finished machined crankshaft. When it is realized that finished crankshafts of the type being discussed weigh up to ten tons or more, the magnitude of the task of machining away approximately the same weight may begin to be appreciated. When it is recognized that the form or shape of a crankshaft is such that much cutting is interrupted, that both tool and forging must be repeatedly set, desire for improved techniques can be better understood.

The first modern day crankshafts of general type had basically rectangular crankwebs of uniform thickness. Their sides were parallel throughout. However, the economic as well as technical advantages of turning the ends was early recognized and practiced. Many technical improvements were later developed. Later this one has had the crankpin end of crankwebs chamfered and corners cropped. These additional operations are frequently made necessary by torsional characteristics and bearing loadings encountered as speeds and outputs have been increased.

Hollow boring of crankpins is not considered in detail here because it can be done with any type crankweb. It is another variable in crankshaft design and manufacture. Improvements result primarily from reduction of crankpin mass rather than changes to crankweb, the particular portion of the crankshaft which is the subject of this paper. Although usually an expensive operation, hollow boring of crankpins is occasionally used. In some instances existing designs have been able to meet new demands by incorporating this feature.

For many years crankshafts of internal combustion engines were designed using fundamentally static concepts. Today, dynamic characteristics determine sizes necessary. Increased speeds have been universal. Increases of brake mean effective pressures average approximately 50% since pre-Pearl Harbor and in some instances have increased over 100%. These make for new and greater demands on crankshafts and related parts. Improved bearing materials and techniques permit specific loadings little more than hoped for previously. Outstanding developments have made crankshaft bearing surfaces capable of carrying these loads. On some engines dynamic dampers continue to take care of some otherwise serious torsional critical speeds. However, the trend is still for stiffer crankshafts with higher natural vibratory frequencies and larger bearing areas.

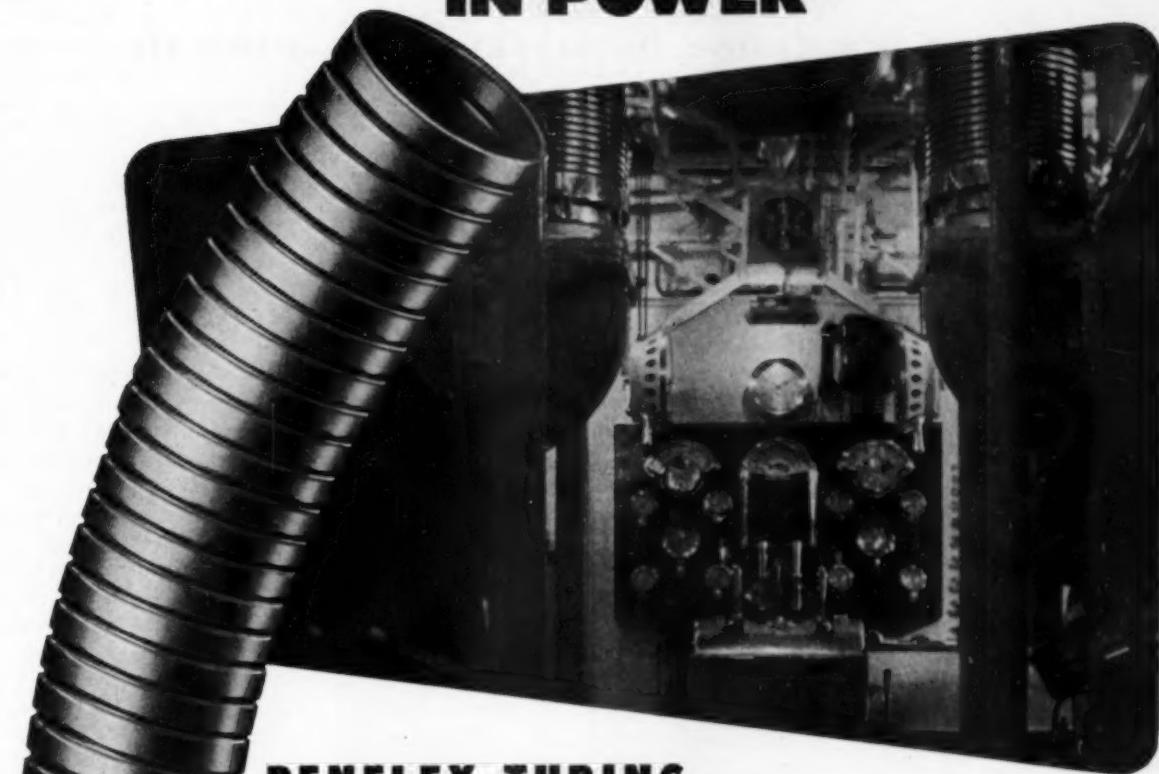
There has been a crankshaft design development which incorporates a crankweb which provides in large measure some of the desired features outlined above. Because all four edges of each crankweb are true arcs of circles it has been named Arcweb.

... and now please turn to page 61 ...

TABLE I

Crankweb Type	Characteristics
Rectangular Ends turned	Wt. 100% Centrifugal force 100% Moment of inertia 100%
Rectangular Ends turned Width cropped	Wt. 93% Centrifugal force 82% Moment of inertia 82%
Rectangular Ends turned Thickness chamfered	Wt. 90% Centrifugal force 74% Moment of inertia 78%
Rectangular Ends turned Width cropped Thickness chamfered	Wt. 87% Centrifugal force 63% Moment of inertia 69%
Arcweb Ends turned	Wt. 89% Centrifugal force 83% Moment of inertia 83%
Arcweb Ends turned Thickness chamfered	Wt. 80% Centrifugal force 61% Moment of inertia 66%

STOPS SHAKES...PUTS PURR-R-R IN POWER



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When two large diesels roar into action, there can be plenty of vibration transmitted to all points. This was true on one installation . . . engine vibration created a regular power throb.

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PENFLEX

HEART OF INDUSTRY'S LIFE LINES



Supervising & Operating Engineers Section

CONDUCTED BY R. L. GREGORY

A DISCUSSION OF DIESEL FUELS—PART III

Foreword: Due to conditions beyond the writer's control, it has been impossible for him to follow up in each month's edition, this discussion on Diesel Fuels. However we are herewith presenting another article on this subject.

IN the last discussion on the above subject, your writer took up the effect of fuel viscosity and spray characteristics between the atomizing equipment of an air-injection and a solid injection unit, and was discussing the multi-holed nozzles, familiarly used on the solid injection unit. There appears to be a wide variance of opinion among operators, and engineers, concerning the proper application and use of these multi-holed nozzles, especially when used with engines burning the heavier types of fuel. This is particularly true with those fuels which come under the category of "Bunker C" fuels. There has been and still is being carried on, a lot of experimentation with these multi-holed nozzles and this type of fuel, not only by Diesel Manufacturers but also by the nozzle manufacturers and individual plants as well.

The object of these experiments being, to determine whether or not there is any particular type of multi-holed nozzle that will give the best overall results under definite injection conditions with a given type of fuel, and thus set up a pattern which can be followed with satisfactory results in all instances.

However, there are so many variables which enter the picture and which have to be contended with, such as fuel characteristics, fuel handling, fuel injection equipment outside of the type of nozzles, such as the pumps, delivery valves, size of injection, etc., that to date, no one seems to have been able to come up with the solution as to a logical pattern which can be followed. About the time that one comes up with a thoroughly satisfactory result and thinks he has the problem about solved, some condition changes, such as fuel characteristics and you find yourself as far off the desired solution as ever.

Now the nozzle manufacturer will possibly claim that this is not exactly the case, that they have developed these multi-holed nozzles to a point where they will give satisfactory results with almost any type of "Bunker C" fuel providing the proper nozzle is applied to any given type of fuel. With this I will agree most heartily, to a certain extent, but the difficulty is in keeping the fuel characteristics uniform, batch after batch. Many operators and supervisors have experienced this difficulty and to cite one case recently brought to the writer's attention, here is what was found:

The fuel in use had been for some time consistently uniform. The crude from which it was supplied had been procured from the same source for several months and as a result fairly satisfactory results were obtained with a definite fuel injection system. Then suddenly the fuel characteristic changed and investigation showed that the original source of crude was not adequate to take care of an expanded refinery production and that this source of crude had been supplemented by adding crude from a different source. While the refinery process and specifications had not changed one iota according to the vendor, this addition of a different type of crude did make a difference in operational results. The irony of the situation seemed to be that on one type of unit the efficiency was improved, while on another it was lowered and from all indications this was due to the change in characteristics of the fuel, since no change was made in the fuel injection or handling equipment in either unit.

Quoting from a letter recently received from one of the representatives of a major oil company to your writer: "During the last few years there has been an increasing interest in how best to burn heavy fuels in large diesel engines such as those manufactured by the major diesel engine manufacturers. We have had some limited first hand experience with a few plants on the eastern seaboard, all burning the same heavy fuel from Venezuelan crude and marketed by a major oil company. This particular fuel contains vanadium, sodium and nickel compounds which have caused excessive combustion chamber deposits resulting in high wear, and not too satisfactory engine performance. There are other plants, some in the middle part of the country, which have been using heavy fuel in their diesel equipment with reportedly generally satisfactory experience.

"As can be appreciated, there are many factors involved in burning heavy fuels in internal combustion engines, such as proper heating facilities, suitable injecting equipment, variation of fuel quality, etc., and it is therefore difficult to be of specific assistance to any plant unless all of the details are at hand for study."

This statement merely substantiates the statements made by the writer on this matter of the burning of heavy fuels, that there are so many variables to contend with that a solution of the problem in the final analysis evolves itself into a cut and try problem in each individual plant. In correspondence from another source we find this statement: "As near as I can determine, heating equipment would be required for heating the heavy fuel in the

storage tank to the necessary temperature for pumping, also a heater to further heat the fuel oil just prior to the injectors in order to further lower the viscosity of an atomizing temperature. The two heaters, of course, are necessary since in the storage tank it will be only necessary to heat the fuel oil to such a temperature to give a satisfactory viscosity for pumping.

"For atomizing, sufficient heat will be required to reduce the viscosity to somewhere between 100 and 200 seconds, which is considered the optimum viscosity for proper atomization. In addition to heating equipment, it is customary to have centrifuges in the line for continuously separating solids, also a filter to prevent any solids entering the injectors. Regarding experience with heavy fuels, we find that using a fuel derived from South American crude, ring breakage and liner scuffing difficulties have been experienced. Our information does not reveal whether this was due to the appreciable quantities of vanadium and nickel present in the fuel, or to a high sulphur content."

There recently came to the writer's desk a reprint from the Chesapeake and Ohio Railroad's house organ, "Tracks" of the May 1953 issue, and while presented from the railroad's point of view it contains some enlightening information with which the writer and most of our readers, I dare say are unaware. However, we are quoting excerpts from it for what they are worth, since it does shed some light on fuel conditions as they are at present:

"THE GREAT DELUGE"

"America's industry, economy and security are being drowned in a flood of cheap, low grade fuel oil pouring into the eastern United States from foreign refineries. Last year alone, oil tankers from refinery ports in Venezuela and islands in the Caribbean dumped 128,000,000 barrels of this fluid, called residual oil, into American cities on the Atlantic Coast."

In pausing just for a comment, more than 30,000,000 tons of bituminous coal never went to market, the bituminous coal mining industry lost some \$150,000,000 in revenue, the miners lost about \$90,000,000 in wages, the railroads lost approximately \$95,000,000 in freight charges and the people who man the nation's railroads lost more than \$40,000,000 in wages.) But now let's return to this question of fuel oil.

"What is residual oil? It is a waste product, left over after gasoline and other products have been removed from the crude oil. It is used as fuel oil

in large utilities and industrial plants mainly on the United States east coast. American refineries, more efficient and seeking more and more value from each barrel of crude oil, do not turn out as much residual oil. Some of it is shipped in American vessels from Gulf to Atlantic ports, a traffic from which foreign vessels are barred by law, but nobody quarrels seriously about that. The oil flows from American owned and American manned wells, and the flow isn't that big.

"The residual oil imported into this country comes from South America—98 per cent of it from crude produced in Venezuela. Most of it comes from two small islands—Aruba and Curacao off the coast of that nation. The people of those areas get little benefits from the industry, most of the profits going to the giant oil corporations which hold a monopoly on the operation. Why is it so cheap? For several reasons: residual oil is a waste product, so there is no production cost to consider once the oil companies have set the selling price. It is shipped mostly in tankers registered under foreign flags. Crews of these vessels do not possess the advantages of American merchant sailors, receive much lower wages, often have sub-standard working conditions. Thus the foreign ship owners' transport costs are considerably less than those of American competitors and residual oils can be shipped to American ports cheaply. If necessary, those who sell foreign residual oils can slash their prices deeply to undercut competition from American fuel sources and still make a profit.

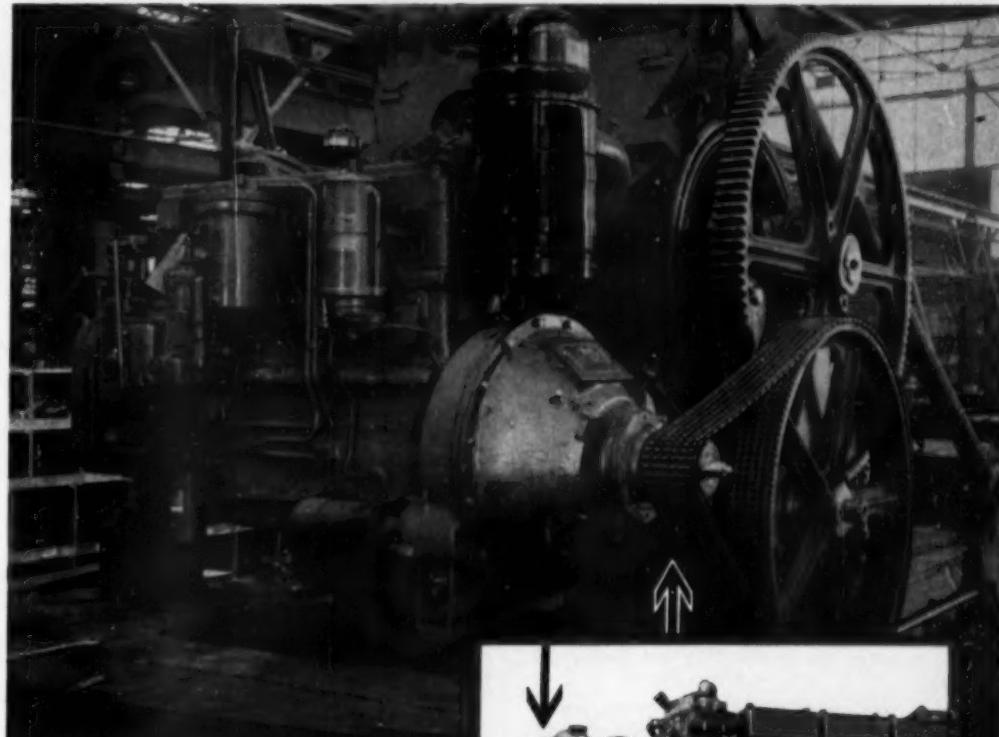
"One big broker said recently, 'Residual is running out of our ears.' The phenomenal growth of the foreign oil imports is due largely to two factors: an increase in South American oil production, and a decrease in the market for cheap residual in Western Europe where refinery capacity has been boosted to new heights since World War II. With markets disappearing elsewhere, the Caribbean oil men are dumping their products where they can still get dollars for them—right here.

"Bituminous coal is hardly the only industry suffering from the great deluge. The domestic oil industry finds itself in the same fix as its traditional rival for the American fuel market. It needs money—revenue from sales—to finance its future operations. Residual oil imports are cutting sharply into its revenues, threaten to produce deficits that could paralyze some of its basic operations. But the greatest danger lies in what residual may do to the security and defense of the nation. Terrific losses for both the coal and oil industries hamper them in their efforts to serve America in the future in peace and in emergencies."

Now someone will remark, what has this to do with the question of diesel fuels? Simply this, many of our diesel operators will try to convert their units to the use of these cheap residual fuels, contaminated by foreign matters such as vanadium, nickel, sulphur and the like which add maintenance problems galore, simply because it is a cheap fuel, not realizing in the meantime that they are doing more harm than good to their units. This little excerpt has been quoted as a warning against the use of this type of fuel unless you first make a thorough

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3350 H.P. Drilling Barge Serviced by NUGENT FILTERS



THE "Blind Pass," one of the largest drilling barges in the world, is serviced by Nugent Lubricating Oil Filters. Owned by Richardson & Bass, the rig is powered by five Superior PTDSC-8 super-charged dual fuel Diesel drilling engines delivering a total of 3350 H.P. To protect this power supply, each of the engines is equipped with a Nugent Filter to remove even the smallest dirt and carbon particles from the lubricating oil.

By actual test, Nugent Filters remove 99.8% of harmful impurities that get into lubricating oil. Particles as small as a few microns are removed before they get inside the engine where they would accelerate wear and shorten engine life. This is the kind of filtering that really pays for itself in oil saved, prolonged engine life and dependability.

Nugent oil filters have 20% more filtering area than filters of equal size. Simple piping makes them easy to install. Recharges are inexpensive and easy to replace. Nugent fuel and lubricating oil filters are available in a complete range of sizes and types to meet every demand. Write for full details.



Above: A Nugent Lubrication Oil Filter of the type used on the drilling barge, "Blind Pass."



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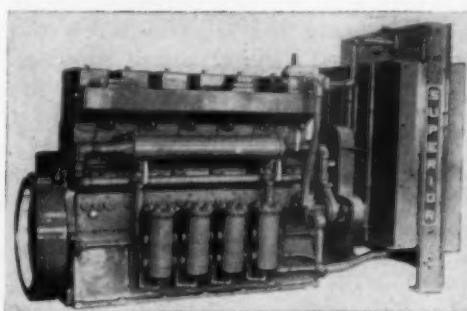
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survey of the results to be expected from changes involving these cheap residual fuels.

We all want to incorporate all the economies available in the operation of our plants but we do not want to do so at the expense of the units we wish to maintain. We all will agree with the American policy stimulating world trade, the encouragement of the investment of American capital in foreign countries and the expansion of commerce with foreign countries, especially Latin America. But America's own basic industries, its employment, its living standards, its defense potentials and its security must also be kept strong and healthy.

In a following issue we will continue this fuel discussion since we have received other reports on this subject of diesel fuels.

New Gas Engine



The new Superior Model G-825 gas drilling engine, exhibited for the first time at the International Petroleum Exposition, Tulsa, Oklahoma, May 14-23, 1953, is available in either 6 or 8 cylinder units. Built by The National Supply Co., Springfield, Ohio, this 10 x 10½ in., 6-cylinder engine has a continuous bhp. rating for drilling service of 450 at 900 rpm. For the same service the 8-cylinder model is rated 600 bhp. at 900 rpm. In addition to drilling service, this engine is equally suitable for generator drives and industrial use. For generator service engine ratings are as follows:

RPM	900	720	600
6G-825			
BHP.	450	360	300
KW. @ .8 PF.	300	250	200
8G-825			
BHP.	600	480	400
KW. @ .8 PF.	400	330	275

Many of the parts on the G-825 are interchangeable with those used on the Superior Model PTD diesel drilling engine, which offers an economy in spare parts for owners of both engines. Another feature of interest is the interchangeability of both type engines on the same drilling rig drive skids. The G-825 is equipped with air starting, oil cooled pistons and with pressure lubrication to main and connecting-rod bearings. Removable cylinder liners are honed for accurate piston fit, valves have insert seats, and exhaust manifolds are water cooled. The engines are equipped with high tension magneto spark ignition, oil-bath air cleaners, full-flow lube-oil filters, a shell-and-tube lube-oil cooler, shut down relays that operate on excessive lube-oil and cooling-water temperatures and the necessary gages, thermometers, and tachometer.



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Only Alcoa produces all three types of pistons—permanent-mold, semipermanent-mold, and forged. Sizes of Alcoa® Pistons range from the smallest to 21" in diameter, and they may be ordered with or without inserts for added ring groove life.

Alcoa Aluminum Pistons weigh less—making possible increased engine speeds and resulting in increased horsepower.

Aluminum's high heat conductivity lowers surface temperatures, and, allows greater engine output without increasing operating temperatures. To get the complete story on *all* Alcoa Aluminum products for the

diesel industry, write: Aluminum Company of America, 1987-H Alcoa Building, Pittsburgh 19, Pennsylvania.

NEW TYPE OF PISTONS FOR FUTURE ENGINE DESIGNS

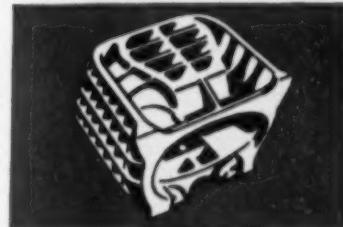
For diesel manufacturers who now have engines in the design stage, Alcoa's research and development teams have produced new types of aluminum pistons which embody many highly desirable features. While they are not yet in full production, Alcoa is ready to talk to manufacturers of high output engines—and to discuss the possibilities of *greater power from the same size engine!*

Alcoa
Aluminum

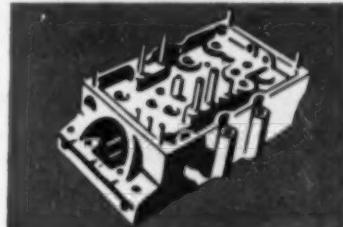
ALUMINUM COMPANY OF AMERICA



CYLINDER HEADS of Alcoa Aluminum distribute heat better, allow increased engine ratings. They also mean lighter weight, easier servicing.

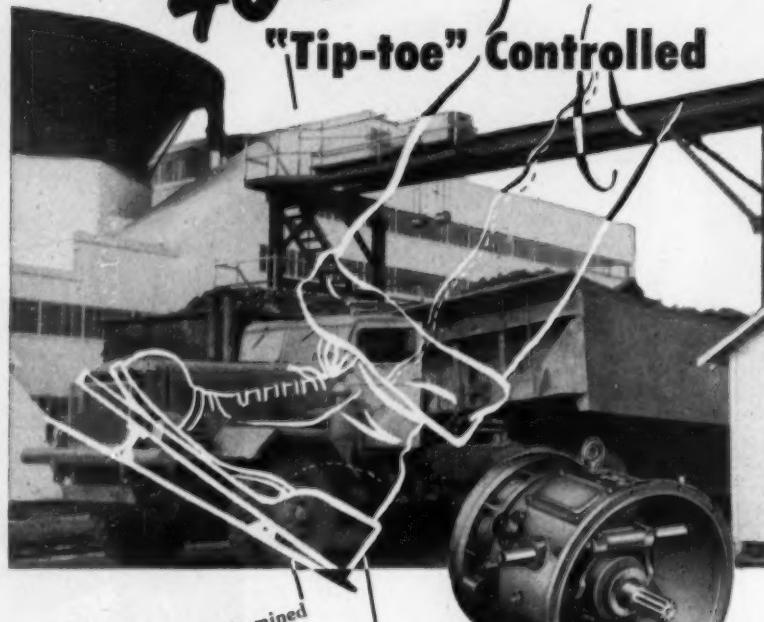


SUPERCHARGING AND SCAVENGING are more efficient through the use of aluminum. Here, too, diesels can save weight through the use of aluminum.



CRANKCASES AND FRAMES of light-weight Alcoa Aluminum give diesels higher horsepower-to-weight ratios, increase efficiency in operation.

120 Tons UP... 40 Tons DOWN "Tip-toe" Controlled



To haul 80 tons of strip-mined coal from pit to tipple, Hume-Sinclair Coal Mining Co., Hume, Mo., ordered a 40-ton tractor-trailer rig from Dart Truck Co. By building a Dart tractor and cab to specification—adding a semi-trailer bigger than a hopper car—and installing a Cummins 400 hp V-12 supercharged diesel engine and a Twin Disc Model CF Truck Type Torque Converter, Dart delivered the super-sized truck.

From the first, the big truck has pulled out of the pit and up the hill with its 80-ton payload—in high gear. The driver simply steps on the accelerator to automatically get up-to-6:1 torque multiplication get highest in the field—and keep 120-ton GVW moving. On the trip back down, with 40 tons of truck, the driver merely lets up on the accelerator to bring Twin Disc's ex-

clusive Converter Braking feature into action; saving brakes, tires, driving train—and operator fatigue. Whatever type trucks you're using—diesel, gasoline, butane—a Twin Disc Truck Type Converter is your answer to faster work cycles and reduced costs. Call, write or wire Twin Disc—ask for new Truck Type Converter Bulletin No. 501.

Hume-Sinclair's 120-ton GVW Dart truck, equipped with Model CF Converter. Twin Disc Truck Type Converters are available in 2 series, 7 capacities each, to handle the majority of heavy-duty truck engines available.

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Sales Manager



The Warner Lewis Company has announced the promotion of Thomas R. Bradley to the position of sales manager. Mr. Bradley joined Warner Lewis Company January 1, 1952 as sales promotion and advertising manager. Prior to his association with the company he was plant manager of Sunray Gas company's wholesale bottled gas plant at Washington, Iowa. He is a graduate of the University of Illinois with a Bachelor of Science Degree. The Warner Lewis Company is engaged in the fabrication and sales of water separators, filters, calibrating tanks, and associated products for the petroleum industry. The Company is represented in the U.S., Canada and Mexico by over 30 representatives.

F-M Branch House



Pictured above is the new Fairbanks-Morse branch house in Seattle, Washington which works under the Portland, Oregon branch under the direction of Mr. J. C. Elmburg, manager. The new branch has a floor area of 9600 square feet. This made up approximately 5000 feet for the warehouse, 2500 feet for the shop and 1000 feet for the office and 1100 feet for the repair department. The building is located at 668 Lane Street and has parking space for approximately 30 cars.

Announces More Powerful "No Pushbeam" Dozer



Following the successful development of the earth moving industry's first big "no pushbeam" bulldozer, the 9X, the Baker Manufacturing Company of Springfield, Illinois, announces production of the bigger, more powerful, new Baker 15X. Developed in cooperation with Allis Chalmers, the new 15X mounts on the A-C HD-15 tractor and features integral tractor-dozer construction; legal highway portability (without permits), only 96 in. wide; big yardage capacity with a 51 in. moldboard; 39½ in. blade rise and 15½ in. drop below ground; greater track oscillation; center of gravity permitting drawbar work with dozer mounted and less weight.

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The Dale Hydraulic Governor offers a modern approach to better Diesel governing. It features effective and dependable governing under all speeds and load conditions and provides greater engine efficiency. The entire unit is built to high precision standards to assure long service life under severe operating conditions.

● ADAPTABLE TO A WIDE VARIETY OF ENGINE REQUIREMENTS

Five readily accessible adjustments permit easy adaptation of unit to many Diesel requirements, reduces part stocking.

● FASTER CONTROL OF RECOVERY TIME

Two needle valves for adjusting recovery on acceleration and deceleration permit rapid recovery without overswing and allow adjustment to full ability of engine to recover.

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Novel linkage arrangement using expansion differentials provides for loss of speeder spring force due to temperature rise. Maintains engine speed as temperature increases.

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Assures rapid heat dissipation.

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Compensation not affected by atmospheric pressures.

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Crankwebs

...continued from page 56 . . .

Arcweb crankshaft design for greatest production economy necessitates greater attention to details of proportion than is normally given. Extremely wide ranges of crankweb proportions are available with proper geometry. The importance of proper geometrical relationships for crankwebs and their machining operations can not be overemphasized for successful end results. To all it is obvious that inferior crankwebs can result in service failures. However, injudicious selection of other physical relationships can result in designs which are perhaps equally unsuccessful because they are inherently too expensive to manufacture.

Desired theoretical crankweb profile can usually be established by three general control points or dimensions: 1. Width of crankweb. 2. Cheek or overlap of crankweb adjacent to: a. Main bearing journal; b. Crankpin. These locate the designer's first preference for crankweb turning centers. After these centers have been plotted for both sides of all crankwebs careful analyses must be made to consolidate all into as few final locations as is possible. To do this well requires a broad approach. Some best results have been worked out through the combined efforts of a Production Department-Engineering Department team. Occasionally, the designer's first preferences have plotted so satisfactory that only very minor changes were found

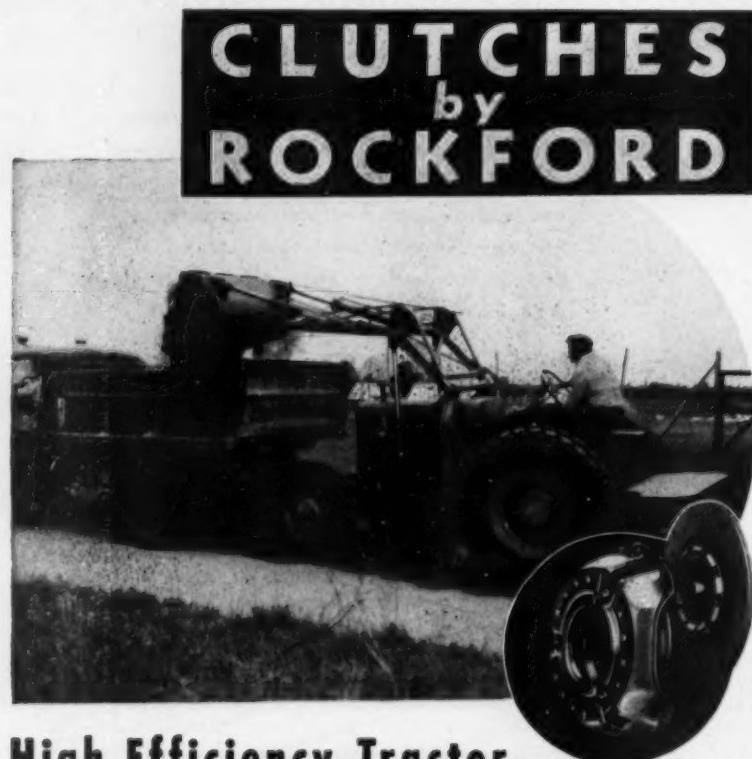
to be necessary. Of course, some proportions have been encountered where the use of Arcweb design did not appear to be economical. However, it has been found that at least many, the writer sincerely believes that most, of today's larger crankshafts would be better if they were designed to incorporate this feature. Since none of the above control features are of necessity inflexible, reasonable modifications are permissible. In the majority of cases investigated, only small modifications have been required to make some previously disassociated crankweb turning centers coincide. When this is done, the design may well be best executed with Arcweb crankwebs rather than with the older, modified rectangular crankwebs.

So far is known there is no magical way to attain the above desired results. The following are the general guides, which to some seem so self-evident as to not merit itemizing, but which have been requested so often that they are included here: 1. Crankweb Turning Radius. With unaltered width of crankweb longer radius results in more cheek or overlap adjacent to both main bearing journals and crankpins. Or with fixed cheeks, the crankweb width is reduced. 2. Relocating Centers. Altering any of the control points or dimensions will correspondingly relocate the resulting crankweb turning centers.

On crankshafts discussed here two sides of two throws, four crankwebs, were machined upon in one set-up. Therefore, profiles of crankwebs of all throws were completely machined with only three set-up positions in machine tool which formed their crankpins and journals. In other words six center throwblocks were used; three centers for crankpins and three centers for crankwebs. This arrangement enabled a better crankweb to be machined to its finished form in less than one-half the time demanded by more conventional designs. This Arcweb design provides a better crankweb because: 1. Same cross section of critical portion adjacent to juncture of crankpin and journal assures same strength. 2. Excessive material is machined away thus providing crankshaft of less weight. 3. Better distribution of material assures less centrifugal forces for reduced bearing pressures. 4. Improved crankweb proportions provide stiffer crankshaft with inherently improved torsional vibration characteristics. 5. In addition to these desirable design characteristics the lower production cost feature is attained with Arcweb as already discussed.

Table I illustrates some typical crankweb designs and tabulates a comparison of characteristics influenced by these design changes. Proportions are intended to be representative only; they should not be interpreted as either maximums or minimums. Basic proportions have been kept unchanged. Crankweb length, width and thickness are identical on all examples. Modifications of design details would alter exact values but general characteristics would prevail.

This paper represents a few thoughts and experiences. It is hoped that others will add theirs. Then, perhaps, it will become a valued bit of our common efforts to improve ourselves and our products both technically and practically. If it provokes further constructive thought and action, its preparation will be considered worthwhile.



High Efficiency Tractor Uses Lowest Cost Fuel

The fuel economy of this Sheppard diesel oil burning tractor is matched by the efficiency of ROCKFORD CLUTCH power transmission control. This combination marks a new era in tractor design. Let ROCKFORD CLUTCH engineers help with the power transmission control design for your new models.

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Increase Fork Lift Production



Ralph K. Mangan

The Buda Company, Harvey, Illinois, has just completed new plant facilities to increase production of its line of fork lift trucks. According to Mr. Ralph K. Mangan, president, the new facilities will step up deliveries to double the previous rate. The present Buda fork lift truck line was introduced by the Company's materials handling division less than two years ago, Mr. Mangan stated, and has met with such favor by industry as to make the current expansion necessary.

Mr. Mangan also announced the appointment of Waldie and Briggs, Inc., to plan and direct an accelerated program of advertising and sales promotion on the Lift Truck line and other Materials Handling Products.

President of Roots-Connersville

J. B. O'Connor, executive vice president of Dresser Industries, Inc., has announced the appointment of Ralph R. Newquist as president and general manager of the Roots-Connersville Blower Division effective June 1. He succeeds R. H. Owens who becomes chairman until his retirement later this year. Mr. Newquist, a graduate of Pennsylvania State College, came to Roots-Connersville in 1946 as vice president in charge of Sales. Since 1951 he has been executive vice president. Before joining Roots-Connersville, he was manager of the Washington, D.C. office for Allis-Chalmers Manufacturing Company.

Brush ABOE, Inc. Expand Operations

The Petter Diesel Engine Division of Brush ABOE, Inc., New York, formerly located in the Empire State Building, announce that they have taken new and substantially larger premises in Woodside, Long Island, comprising offices, showroom and warehouse. Apart from a general expansion of the company's U.S. activities, this move has been prompted by their decision to take over the distributorship of their products in six of the eastern states. As a consequence, they will carry a much larger stock of engines and spare parts, which should prove beneficial not only locally but to the Petter sales program throughout the country. This increased stock will be available in cases of emergency to all the distributors of Petter engines in the United States, as well as taking care of the needs

of the various local dealers that Brush ABOE, Inc. are in the process of establishing.

This reorganization in no way interferes with Brush ABOE, Inc.'s function as representative of the Brush ABOE Group for the whole country, nor does it change their relationship with the U. S. Petter distributors. They will still act in an advisory capacity to them, technically and commercially, and as liaison with the company's head offices in London, England. The Petter small diesel engines in the range from 3 to 40 hp. have become well known here in the past few years, both in the industrial and marine fields. They have been exceptionally successful and practical, for example, as auxiliaries in all types of small craft and in

powering sprinkler irrigation systems, oilfield pumping equipment, marine and industrial refrigeration units and agricultural machinery. The Petter AV2C compressor set developed primarily for starting Brush ABOE diesel units in the 400 to 3,000 hp. range, was recently made available to this country and has created a new field of application for Petter products.

With the increased space and necessary additions to their staff, Brush ABOE, Inc. are also making arrangements to introduce to the American market a range of small electric motors designed to N.E.M.A. standards, which are currently in quantity production at the plant of the parent company, Brush Electrical Engineering Company.

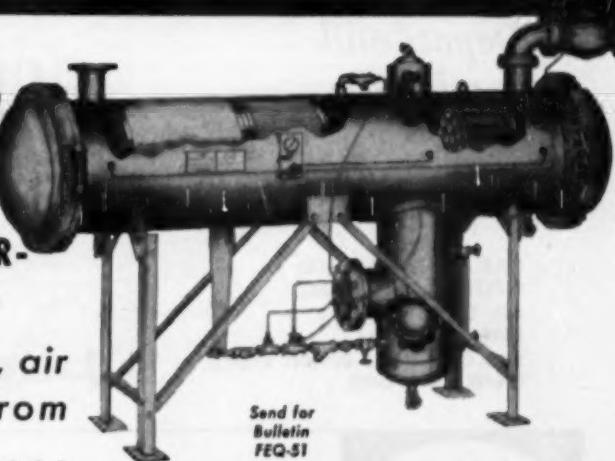
There is a vast difference between the easy job of removing warm water, dirt, and pipe scale from warm diesel fuel (Vis. 35SSU @ 122°F) compared to the almost impossible job of removing cold water, or ice crystals, from cold, viscous diesel fuel @ 10 F.

The 4-Stage EXCEL-SO Separator/Filter is designed to operate under these conditions, more efficiently, at less operating expense, than conventional single stage, or two-stage Filters only.

EXCEL-SO

**4-stage
SEPARATOR-FILTER-
AIR ELIMINATOR**

**removes water, dirt, air
and pipe scale from
diesel fuel**



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Inland River Reports

By David I. Day

THE Midwest Cities of the Lake Tankers fleet is now pushing two-barge tows of oil up to St. Paul, one of the late comers in the summer trade. Her engine room in charge of James Neff has been powered since 1948 with one 850-hp. General Motors engine.

THE OLD steamer *Samuel L. May*, named after a bank official and capitalist of Evansville, Ind., has been dismantled at Huntington, West Va., being superseded by the 350-hp. *Ernestine*, both boats the property of Union Sand & Gravel Co. The

steamboat has not been used much for several years. The *Ernestine* is a sternwheeler with National Superior diesel.

NEWSPAPERS along the upper Ohio and Monongahela Rivers were full this month of old stories of the C. D. O'Connor, once the *Sailor*, the property of Jones & Laughlin Steel Corporation, Pittsburgh. The old boat, one of the most popular in the coal trade, has been dismantled being unable to compete with diesel vessels now being used by the steel company. It is rumored that other J & L steamers *Wm. Larimer Jones* and *Titan* will be replaced this summer with diesel towboats.

WE NOTED the *City of Maysville*, owned by the

Triangle Towing Company, Maysville, Ky., working very nicely on the Monongahela River approaching Floreffe, Pa., with a tow of gasoline. This is a boat of many names. The hull belonged to the old steamer *Tallulah*, later renamed the *Walter F. Carey*, changed to diesel and called *Commercial Dixie* and *Commercial Tennessean*. Her engine room has twin Superior diesels totaling 800 hp. This was her first or second time to be on the Monon.

FROM Letcher McClain near Memphis, Tenn., we have recent snapshots of the diesel vessels *Illini* and *Petco 20*, the former "with a miscellaneous tow and the latter with barges evidently on her way for another big tow of oil. Both have fine smooth engines, real boats." The *Illini* of the Illinois Farm Supply Co., was built at the yards of the Jeffersonville Boat & Machine Co., and has Cooper-Bessemer triplets, 2200 hp. The *Petco 20* is a nearly new boat of the Petco Corporation, built at Sturgeon Bay (Wis.) yards utilizing General Motors twins, 1800 hp.

CHARLES FIELD is the efficient chief engineer on the *Lin Smith*, the big triple-screw diesel boat, which has been making record tows on the upper Ohio all year. This boat is owned by the Mississippi Barge Line, was built by Nashville Bridge Company in 1946. The boat uses Cooper-Bessemer diesels.

WE HAD a good look lately at the *Inca* of the Indian River Lines pushing rapidly up the Ohio with six barges of gasoline and an empty or two. John Stroder is currently chief engineer on this very efficient Superior twin-engined work boat.

THE COMMISSIONING and christening of the M.V. *Crane* of the U. S. Engineers, St. Louis district, recently occurred and the 500-hp. towboat, powered with a Fairbanks-Morse engine is now at work towing fuel oil and rock on the Mississippi between St. Louis and Cairo, Ill., at the mouth of the Ohio.

THE Maxon Construction Company, Tell City, Ind., have completed another diesized dredge for The Bedford-Nugent Company, Evansville, Ind. The dredge uses a 450-hp. Enterprise diesel engine on an Elliott generator. An auxiliary generator is driven by a General Motors diesel engine. The all-steel welded hull is 124 x 34 x 6½ feet.

THE Gene C. Hutchinson of the Hutchinson Barge Line recently pushed down the Illinois and Mississippi Rivers, from Lemont, Ill., to Memphis over 15,000 tons of high-octane aviation gasoline. This is the largest down-stream gasoline tow in the history of river transportation. The *Hutchinson* came out from St. Louis Ship in 1952 and is powered by twin General Motors diesels. (A part of the tow was diverted to Cincinnati, O.)

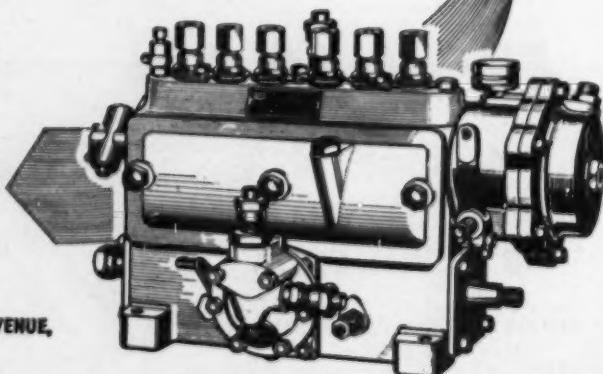
THE *Valvoline* of the Ashland Oil fleet has made her first trip to Pittsburgh within recent days. She has been for years, however, well known on the lower Ohio and the Mississippi. She was originally named the *Sohio Cleveland*. Built in 1949 at St. Louis Shipyards she has twin General Motors diesels totaling 3200 hp.



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Long life is an important characteristic of these Brown & Sharpe Rotary Geared Pumps. Extremely accurate helical gears and precision antifriction bearings assure smooth, efficient operation at high speeds and under pressures up to 200 psi. Specially designed mechanical seal prevents leakage and eliminates gland adjustments.

Two sizes available—No. 53 with 4 to 23.3 gpm. capacity, and No. 55 with 9 to 34.1 gpm. capacity—at 0 lbs. pressure. Write for Pump Catalog listing complete line for diesel applications. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

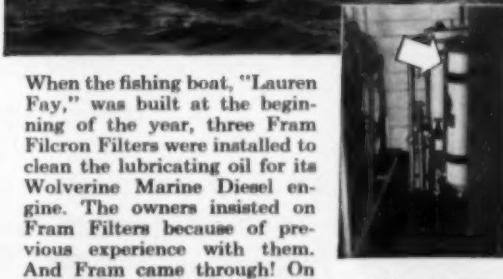
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FRAM FILTERS

give the "Lauren Fay"

- ✓ longer engine life...
- ✓ more savings...
- ✓ greater safety!



When the fishing boat, "Lauren Fay," was built at the beginning of the year, three Fram Filcron Filters were installed to clean the lubricating oil for its Wolverine Marine Diesel engine. The owners insisted on Fram Filters because of previous experience with them. And Fram came through! On duty 24 hours a day while at sea, these Fram Filters have cut operating expenses by reducing engine wear and necessitating fewer oil changes. And by insuring more reliable engine performance, Fram has added greatly to the safety of the crew.

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Whatever your filtering problem—lube or fuel—Fram Filters are the solution. Let Fram's Engineering Department PROVE that Fram Filters remove all engine-killing contaminants one micron (.000039") and larger... keeping oil clean even after maximum use. Fram Filters pay for themselves by reducing wear on liners, rings and bearings; increasing time between overhauls, cutting rate of oil consumption. Make your diesels produce at top efficiency for the lowest possible cost... write TODAY to the FRAM CORPORATION, Providence 16, R. I. In Canada: Fram Canada Ltd., Stratford, Ontario.



FRAM Filcron
THE MODERN OIL FILTER

Fast Gravel Haul



Jaeger Sand & Gravel Company, New Berlin, Wisconsin, utilizes nine Model 921 Diamond T tractors, powered with 150 hp. Model HB-600 Cummins diesels in a fast moving city gravel haul operation.

These trucks, pulling 13 yards of gravel and mason sand, average between 250-300 miles each day hauling to construction projects in the Milwaukee area. The units average eight miles per gallon of fuel consumed and have increased production by more than one trip a day per unit over gasoline trucks formerly used on this operation. Here, one Diamond T takes on a load of gravel, while another waits its turn.

Particle Size Distribution Analyzer

A newly designed instrument which quickly and accurately determines the particle size distribution of powdered materials has just been placed in pro-

duction by the Sharples Corporation Research Laboratories, Bridgeport, Pa. Known as the Sharples Micromerograph, this high precision instrument will be of unusual interest to numerous industries producing or handling such materials as cements, pigments, metal powders, abrasives, ceramics, drugs, insecticides, cosmetics, and hundreds of others. Since the important characteristics of a powder are closely related to the particle size distribution of that powder, an accurate, simple and quick means of making a particle size distribution analysis is of the greatest importance, not only as a research aid, but in production and quality control. The instrument utilizes a technique in which powder particles are dispersed in air and are allowed to settle under the action of gravity through a tube onto a servo-electronic balance. The balance yields a continuous record of the weight of powder settled, plotted against time. Through the application of Stokes' Law of Fall, a particle size distribution curve is obtained.

NEW YORK, NEW HAVEN & HARTFORD'S NEW TUG CORDELIA

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PIONEERS IN MODERN
OIL FILTRATION



EQUIPPED WITH A SPACE SAVING BRIGGS CD CLARIFIER

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- IT FILTERS

Again a Briggs Clarifier has been chosen because this compact unit embodies a 175 gallon oil storage compartment, a full flow strainer, and 16 Briggs Disc-Pac, All Cellulose Filter Cartridges.

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EXCLUSIVE DISC-PAC ALL CELLULOSE FILTER CARTRIDGES GIVE

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Long fibered cellulose discs of controlled porosity provide the basis for long lasting peak in dirt filtration. Briggs patented discs, scientifically designed and assembled into a cartridge of modest initial cost, proves extremely economical in long run use.

Fewer cartridge changes and outstanding dirt holding capacity make the Briggs A-414 the "year in and year out" choice of many big names in marine transportation.

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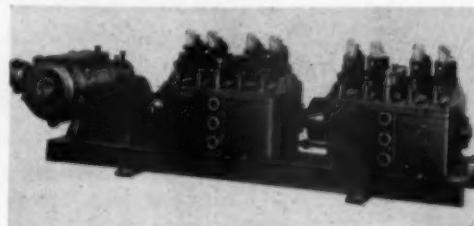
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FOR OVER A QUARTER OF A CENTURY ... designing and manufacturing dependable filtration for Marine, Industrial and Railroad use.

THE BRIGGS FILTRATION COMPANY, RIVER ROAD, WASHINGTON 16, D.C.

Further information and complete details will be supplied promptly if requests are addressed to the Sharples Corporation Research Laboratories, 424 W. Fourth St., Bridgeport, Pa.

High Pressure Lubricators



New high pressure force feed lubricators designed for service at up to 30,000 lbs. have been announced by Manzel Division of Frontier Industries, Inc., Buffalo, New York. Already being used successfully by chemical companies for cylinder and bearing lubrication of compressors, these lubricators are suitable for many other high pressure applications. Two models are offered. The HP20 Model has a pump assembly with $\frac{1}{2}$ in. diameter plunger and will pump $6\frac{1}{2}$ drops of SAE 40 oil per stroke against 20,000 psig. The HP30 with $\frac{1}{4}$ in. diameter plunger pumps 4 drops of SAE 40 oil per stroke against 30,000 psig.

The lubricators consist of four integral sight feed and pump assemblies mounted on a rugged cast iron reservoir. They are directly connected to a gear motor and attached to a rigid base. Pumping units are easily accessible and removable without disassembling the lubricator. Pumping rate is controlled by positive, fingertip adjustment. Steam or electric heaters are easily incorporated. The result of years of development, Manzel high pressure lubricators have proven in rigid tests to be completely dependable under every conceivable condition. Complete units and replacement parts are to be available at all times from stock.

Changes Headquarters

R. G. LeTourneau, Inc., formerly located in Peoria, Illinois, has transferred its headquarters to Longview, Texas.



Chrome-Faced Cyclan Ring

*high-strength
heat-treated
resilient
long-wearing*

Cyclan

offers a combination of
advantages not found in any other
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Sealed Power's new alloy for extreme operating conditions

Developed by Sealed Power metallurgists after years of experimenting and testing, Cyclan has strength approaching steel, resilience and life-expectancy exceeding cast iron, yet it retains the desirable bearing characteristics of cast iron. Cyclan has exceptional ability to retain these unique physical properties under extreme operating heat.

Cyclan piston rings will not break in super-charged engines. Their gaps will not change. They have extraordinarily high impact value for shock resistance. Resilience persists even after considerable distortion.

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Cyclan can be readily chrome plated, but it functions very efficiently without any plating.

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Let our engineers tell you the Cyclan story!



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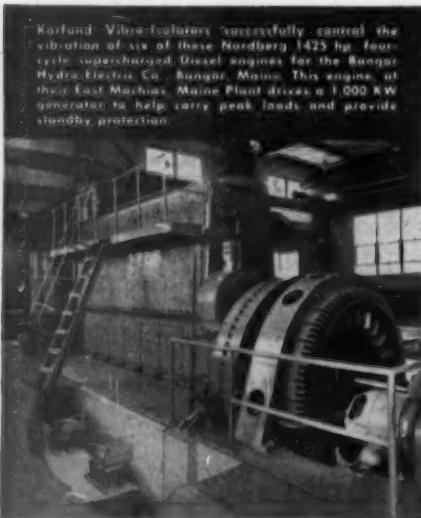
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PISTON RINGS • PISTONS
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Hallett Diesels are the most compact power plants—only 24" high, 14½" long, 18" extreme length over muffler, and extreme length over crank and power take off shafts 26¾"—5 full shaft BHP with continuous operation—7 shaft BHP for intermittent operation.

Other Hallett Diesels to 18 HP. Write today and find out why compact Hallett Diesels will do a better job for you.

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STOP VIBRATION WITH KORFUND VIBRATION CONTROL



A Few Typical Installations

Lanes Hill Hospital, New York.....1 750-hp. Worthington
2 Park Avenue, New York.....4 450-hp.; 1 750-hp. Worthington
New Yorker Hotel, New York.....1 950-hp.; 1 750-hp. Busch-Sulzer
Macy's, New York.....1 700-hp. Alco
Floyd Bennett Field, New York.....1 450-hp. Fairbanks-Morse
Prudential Ins. Co., Newark, N. J....1 740-hp. Baldwin
Pacific Tel. & Tel. Co., Calif.....1 525-hp. Sterling
Lane Star Gas Co., Dallas, Texas.....1 400-hp. Cooper-Bessmer (Gas)



Special recommendations on request, without obligation. A half-century of experience is at your disposal. Representatives in principal cities.

Switching Locomotive



American Locomotive Company and General Electric Company have announced the introduction of an 800 hp. switching locomotive with a new diesel engine designed especially for this locomotive. The locomotive has continuous tractive effort of 40,000 lbs. with 60 mph. gearing. Its base weight is 230,000 lbs. and as a modification can be ballasted to a maximum fully-loaded weight of 248,000 lbs. The Alco-GE 800 hp. switcher has an over-all length of 44 feet 11 inches, with a wheelbase of 30 feet. It is equipped with GE-752 type traction motors used on all Alco-GE road-type locomotives and road switchers and offers fully-automatic transition.

The 4 cycle engine, known as Model 251A, is an Alco in-line design introduced with this locomotive. It has 6 cylinders of 9-inch bore and 10½-inch stroke and develops its rated horsepower at 1000 rpm. The engine incorporates proved features of both the Alco 244 series Vee-type, 9" x 10½" engine and the Alco 539 series in-line 12½" x 13" engine. One of the new features of the new engine is a lubricating oil system including filters, strainers, cooler and pressure regulator which is built integral with the engine and is mounted on the cylinder block. This arrangement eliminates external lubricating oil piping normally found on the locomotive chassis. It is equipped with self-draining radiators, a feature allowing use of a cooling water system with a capacity of only 85 gallons. In cold weather, this permits fast warm-up.

The engine is turbocharged with an Alco 320A water-cooled turbocharger with cast-iron casing. Individual fuel injection pumps are mounted adjacent to each engine cylinder and completely enclosed. The governor is hydraulic type with solenoid shutdown. The mechanical overspeed trip automatically stops the engine when it overspeeds. The camshaft gears are forged steel of single helical type. Barring for setting crank position is provided by a special bar designed to engage a circular slot in the generator fan. A crankshaft extension is provided on the free end of the engine for connection through a coupling to an air compressor and radiator fan.

A primary fuel filter of the waste-packed type and a secondary fuel filter of the paper-disc type are mounted on the engine. The entire fuel system is designed to avoid any lube oil dilution. A positive crankcase exhauster fan, driven by an electric motor, is mounted on the engine's generator end.

YOUR COPY OF DIESEL ENGINE CATALOG in its eighteenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. \$10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

Announces Representative, New Service Unit

Farr Company of Los Angeles announces the appointment of Air Filter Sales & Service Co., Jackson, Miss. and Air Filter Sales & Service Co., Nashville, Tenn. as representatives in their respective areas for Far-Air Products. Marshall, Neil & Pauley, Inc., Texas and Louisiana representatives for Farr, have organized a subsidiary company in New Orleans, the Air Filter Company, to handle Far-Air sales and certified filter service in the New Orleans territory, it was also announced.

Appointed Director



Edward M. Redding

The Sharples Corporation Research Laboratories, Bridgeport, Pa., has just announced the appointment of Dr. Edward M. Redding as director of research. This appointment is an important step in an accelerated development program undertaken by the Sharples organization during the past year. Dr. Redding takes over the post held by Philip P. Sharples, who continues as vice-president in charge of research. Dr. Redding comes to Sharples from the Charles F. Kettering Foundation, Dayton, Ohio, where he was director of research since 1948. The principal research efforts under his direction were in the fields of solar energy and photosynthesis, pointing toward the development of a commercial process for converting solar energy into useful power. At the Sharples Corporation Research Laboratories, Dr. Redding will be responsible for all present and future research projects and will coordinate the various activities of the laboratories.

New Correct Craft Cruiser

Luxury and comfort are combined with economy of operation and longer cruising range in this new Correct Craft flying bridge cruiser equipped with twin Graymarine 100 hp. diesel engines. The 42 ft. Miamian is one of the newest models in the Correct Craft line, and she carries the finest of equipment in her double planked, solid mahogany hull. Two of these cruisers have already been ordered powered with the new lightweight Gray 427 cu. in. diesel engine. The paired installation, with all the advantages of diesel power, delivers 200 horsepower from a total weight of only 3000 lbs., and uses hydraulic reverse gears and 2:1 reduction gear ratio.

Deep-Well Acidizing Rig



Operators of oil well acidizing equipment have had to design more powerful pumping units to keep pace with drillers who are constantly sinking

wells to deeper and deeper levels. Such a rig will be exhibited by Dowell, Incorporated, subsidiary of the Dow Chemical Company, at the International Petroleum Exposition in Tulsa. Wells over two miles deep are being acidized successfully today, but this firm, one of the country's largest well-servicing organizations, now has a rig with sufficient power to operate at even greater depths and pressures than those now generally encountered. Illustrated is a unit, recently put into operation which was designed to deliver 70 gallons of chemical per minute against a pressure of 7500 pounds to the square inch.

In providing the greater pumping power, care had to be exercised to preserve the mobility of the rig.

A General Motors Twin-Six Diesel engine which delivers 300 hp. was selected. It weighs less than 6000 pounds and measures only 72 in. x 54 in. overall. The comparatively lower weight and small size of this two-cycle engine eliminated complications anticipated when plans for mounting an engine to this horsepower on an easily transportable rig were first considered. The pump chosen was a DRE 4½ in. x 8 in. roller-bearing triplex. According to Dowell engineers, future models planned with the same type of power will treat wells with pressures ranging up to 15,000 psi. Representatives of the Diesel Power Company, Distributors for Detroit Diesel Engines in Tulsa, engineered the power plant to the job and helped work out assembly details.

with
VAPOR BLAST*
liquid Honing*

CLEAN PISTONS 14 TIMES FASTER...IN MAINTENANCE OPERATIONS



That's the experience of Pacific Intermountain Express, one of the nation's leading motor freight carriers, in their Diesel maintenance operations at Denver.

With Vapor Blast Liquid Honing equipment P.I.E. has cut piston cleaning time from 14 hours to 1 hour.

DE-BURR INJECTOR CUPS 8 TIMES FASTER...IN ORIGINAL MANUFACTURE



That's the experience of Cummins Engine Co., Inc., Columbus, Indiana. Write for portfolio of authenticated case histories of cost savings through Liquid Honing in the Diesel industry.

Liquid Honing removes internal burrs on injector cups which are virtually inaccessible to conventional methods.

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Under separate cover we are sending you a part for FREE DEMONSTRATION of VB Liquid Honing. We expect a complete report with return of part.

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"Vapor Blast" and "Liquid Honing" are trademarks.



Model 3030, Type B-20

HOW TO CLEAN SPRAY TIPS



View of tip improperly cleaned. Note bell-mouthing of holes.

It is important to maintain the original high polish on spray tips—especially on the nose—in order to reduce carbon deposits as far as possible. The following method of cleaning tips is recommended when they become coated with carbon:

1. Prepare a cleaning solution by dissolving in water, some "Lakeseal TU-2 Cleaning Compound" in the proportions of one ounce of compound to

each gallon of water. This is obtainable from Finger Lakes Chemical Company of Etna, New York. Any ordinary container which can be heated is suitable, even a clean tin can. 2. Entirely submerge the spray tips in this solution. Heat to boiling and boil for 10 minutes. 3. Remove tips from solution and wipe dry with a clean cloth. Use compressed air to blow out each spray tip from the orifice end. Dry each tip thoroughly. 4. Rotate each tip in a collet or chuck, using a split ring sleeve to hold it by its small outside diameter. Polish the entire "nose" with a piece of crocus cloth dampened with oil. This should restore the exposed end of the tip to its original high polish without damage to the orifice holes.

Important. Do not use emery cloth or any form of wire brush to clean tips, as this will cause "bell-mouthing" of the holes and will roughen the surface. Rapid accumulation of carbon may cause



Tip properly cleaned. Note sharp, even edges of holes.

engines to smoke and cause other trouble. Spray orifices may then be cleaned and measured for possible wear by using the proper size wire gauge or steel music wire in a pin vise. The extent to which worn and oversize spray orifice holes reduce combustion efficiency varies with different engines. In general, all spray tips should be discarded when more than half the number of orifice holes are .0006 in. or more oversize.

Comparison Operating Data—Certain REA-Financed Internal Combustion Generating Plants
April 1953

Plant No.	Size kw.	Gross Generation M KWH	Sta. Ser. %	Plant Factor %	R P C Factor %	Fuel-Cost Oil \$/gal.	BTU per KWH	HP/Hrs. per Gal. Lube	Man-hrs. Oper. Maint.	Labor Mat. \$	Production Costs Mills/Net KWH			BEST OF THE MONTH		
						Gas \$/MCF					Labor	Fuel	Others	Total BTU/KWH		
17B.	3,939	1,150.4	3.3	40.5	63.7	9.53	9736	6359	822	112	246.82	1.60	6.96	.64	9.20	9736
18.	3,475	940.6	4.4	37.6	84.4	9.22	9675	4673	860	64	51.50	1.98	6.72	.44	9.14	9675
19B.	4,086	510.6	3.2	17.3	83.0	8.72	9796	3939	736	—	—*	3.87	6.39	—	—	9736
20.	3,939	556.8	2.6	19.6	45.4	10.39	9843	23,375	351	41	—	1.33	7.50	.20	9.03	9843
23.	6,525	1,447.0	4.1	30.8	58.9	10.88	9823	11,999	1026	153	—	1.41	7.65	.36	9.42	9823

A WIRKKALA PROPELLER

... drives the ocean troller HARVEST QUEEN. Captain Wally Leback reports great improvement with a WIRKKALA PROPELLER.

Captain Wally Leback, after the first trip out with the new wheel on the HARVEST QUEEN, reports: "There has been a great improvement in overall performance—more speed at cruising RPM . . . the engine will idle down to 300 RPM with no gear lash or vibration . . . also silent propeller performance at all speeds."

Salmon are allergic to excessive propeller noise and vibration.

WIRKKALA PROPELLERS WILL INCREASE YOUR PROFIT MARGIN BY DECREASING YOUR OPERATING COSTS

Invented by Mr. Oscar Wirkkala and tested under the severest operating conditions, this new WIRKKALA propeller has proved itself the most advanced propeller in use today. Protected by world patents.

Phone, Wire or Write TODAY for the FACTS

WIRKKALA PROPELLER SALES, INC.
Naselle, Washington



HARVEST QUEEN, 46 ft. troller built by Ilwaco Boat Works and powered with a 6-71 GM Diesel with a 3:1 reduction gear, and 40 x 24 in. WIRKKALA propeller.



Engine room of the George T. Norton diesel-powered river tow boat, of the John I. Hay Co., Chicago, which can tow 200 freight cars up stream. Left front Viking two-way lube oil pump.



DIESEL-POWERED TOW BOATS Rely Upon VIKING ROTARY PUMPS

Vital lubricating oil is delivered to bearings of two diesel engines with Viking automatic lube oil pumps, whether tow boat moves forward or in reverse. The pumps derive power from crankshafts of engines and operate in both directions. This exacting job requires dependable pumps and Vikings deliver satisfaction.

Your pumping problem may call for the Viking rotary pumping principle—"a gear within a gear" and only two moving parts. For descriptive bulletin 53SN write

VIKING PUMP COMPANY
CEDAR FALLS, IOWA

District Manager



M. L. Hiller

M. L. Hiller, who has been a field engineer in the Washington, D.C. office of Elliott Company, has now been appointed district manager, replacing S. K. Hostetter, Jr., who is now sales manager of the Amperie, New Jersey, plant of Elliott Company. Mr. Hiller started with the Elliott Company in the turbine engineering department, having been graduated as a mechanical engineer from Carnegie Tech. In 1941 he was ordered to regular army duty with the rank of captain. After various responsible wartime assignments, Mr. Hiller was relieved from active duty with the rank of lieutenant-colonel in 1945 and immediately reported as a field engineer to the Washington district office.

The F-M Trainmaster



Officials of the nation's railroads got their first look recently at the Fairbanks-Morse Trainmaster, world's most powerful single-engine diesel locomotive. The 2,400 horsepower diesel was unveiled to the railroad industry at the recent Railway Supply Manufacturers Association exhibition-convention in Atlantic City. Two units, forming a 4,800 hp. locomotive, were on display and, following the show, went on to be demonstrated on Eastern railroads. Another pair has been sent from the Fairbanks-Morse factory at Beloit, Wisc., for demonstration on Western roads. The first ten Trainmasters to be delivered for regular service will go to the Delaware, Lackawanna & Western Railroad.

And impressive list of "firsts" is claimed for the Trainmaster by the manufacturer: 1. The locomotive is powered by a 12-cylinder F-M opposed-piston diesel rated at 2,400 hp., the most powerful diesel in railroad service. 2. The 1,660 kilowatt Westinghouse generator is the most powerful single generator ever built for railroad use. 3. The maximum continuous tractive effort of 78,750 pounds is the highest available in any single-unit diesel locomotive. 4. The dynamic braking system permits each Trainmaster unit to dissipate 3,000 hp. at the rail over the braking speed range, actually 50 percent more than the pulling horsepower of the locomotive and from 50 to 100 percent more than the braking capacity of any 1500 or 1600 hp. four-axle locomotive in service. 5. The largest quantity of operating supplies ever carried on a single locomotive is included in the Trainmaster: 1,800 gallons of fuel, 48 cubic feet of sand, and 2,400 gallons of train heating water. 6. The largest available steam generator for railroad serv-

ice has been included, giving the Trainmaster capacity to heat a 15-car passenger train in zero weather.

Most important feature of the new locomotive, according to V. H. Peterson, Fairbanks-Morse vice-president in charge of railroad sales, is its ability to handle all heavy jobs on the railroad's work schedule. High continuous tractive effort and high dynamic braking capacity enable the locomotive to handle heavy freight hauls at relatively good speeds. The Trainmaster also can be geared for crack passenger runs with maximum speeds up to 80 miles per hour. All accessories and special equipment required for all classes of service can be installed in a single unit at the same time, making

it unnecessary to substitute one feature for another. Mr. Peterson pointed out that this makes the Trainmaster in effect a universal locomotive and vastly increases its versatility and utility to the railroads. Where power greater than 2,400 hp. is required, the multiple locomotive can be made up with fewer Trainmaster units with lower initial investment and lower operating cost. Mr. Peterson said.

YOUR COPY OF DIESEL ENGINE CATALOG in its eighteenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. \$10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

Eaton Parts for Diesel Engines



**have a background of
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Eaton is proud to have served as supplier to leading Diesel engine manufacturers for many years—furnishing valves, free-valves, lash adjusters, valve seat inserts, cam followers, bolts, studs, and other precision

parts. This close cooperation with the Diesel industry has given Eaton engineers a thorough understanding of the requirements of specific engines, so essential in solving valve-train and other problems.

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PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers



How much of your engine maintenance bill is due to repair of breakdowns that could have been avoided—if you'd had advance warning?

At a fraction of that cost, Alnor Exhaust Pyrometers offer you a constant check of engine performance—advance warning of

**Cylinder Overload Preignition
Scaled Jackets Clogged Ports
Detonation Faulty Injection**

Get the best from your diesel—minimum fuel consumption per horsepower and long service uninterrupted by foreseeable breakdowns. Get constant protection of your engine, cylinder by cylinder, with an Alnor engineered Exhaust Pyrometer System.

Get Full Information—Quickly! Your nearby Alnor Diesel specialist is conveniently listed in the classified directory. Ask him to help you select the Pyrometer and thermocouple assembly designed for your engine. Or send for Bulletin 4361 with complete details of the full Alnor line of Pyrometers.

Every Diesel Deserves Alnor Protection.



**Man knows only that
which he can measure**

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Chicago 10, Illinois

Adds 35-Tonner to Line

The General Electric Company has added a new 35-ton twin-axle diesel-electric locomotive to its line of industrial switchers. G. W. Wilson, general manager of the company's Locomotive and Car Equipment Department, says the new 35-tonner will fill in the GE line between the smaller 25 tonner and the larger 45 ton locomotive. GE now has a complete line of seven industrial switchers ranging in weight from 25 to 95 tons and in power from 150 horsepower to 660 hp. The new 35-tonner is 9½ feet wide compared with the 8 foot width of the 25 tonner, the extra 1½ foot width making it possible for the operator to see around larger railroad cars. It is built 1½ feet lower than the 45 tonner facilitating operation through low doorways in plant buildings.

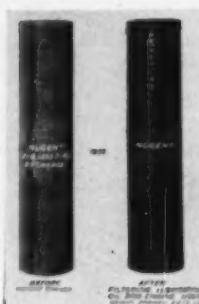
The new locomotive is equipped with recessed Pullman type steps providing easier access to the deck and affording greater safety to the brakeman. It has one Cummins Model NHBIS-600 diesel engine nominally rated at 275 hp. at 2100 rpm. It is directly connected to a General Electric Type GT-558 dc. shunt-wound generator which is equipped with a winding to permit it to be used for starting the engine by storage-battery power. Starting tractive effort of the locomotive is 21,000 pounds at 80 percent adhesion. On the level it will pull an average of 66 percent more weight. There is one auxiliary generator, mounted on the engine, to furnish auxiliary power at a constant potential over the full operating range of engine speed. A 16-cell, lead-acid type storage battery for starting the engine and for supplying auxiliary power when the engine is shut down, is charged from the auxiliary generator.

The locomotive has two GE dc. traction motors each of which drives through double-reduction spur gearing. It is equipped with single-station, single-unit control with the operator's station placed on the right-hand side of the cab. Grouped at this station are the throttle lever, reversing lever, brake valve, sander valve, bell and whistle controls, window-wiper controls, gage panel, and switches for controlling lights. The locomotive speed is controlled by the throttle lever, which regulates the diesel-engine output and is also interlocked with the electrical control. Maximum speed is 20 mph. Air-brake equipment is straight air, with one self-lapping engineer's valve. Two brake cylinders are mounted on the underframe and operate fully-equalized brake rigging which applies one shoe to each wheel. A hand brake of the ratchet and drop-lever type is provided for holding the locomotive at a standstill. Automatic air for trainline braking and brakeman's steps to meet Interstate Commerce Commission specifications can be furnished. Although standard weight is 35 tons, the locomotive can be ballasted to 40 tons.

Annual Meeting

The Oil and Gas Power Division of ASME will hold its 1954 Annual Meeting at the Muehlbach Hotel, Kansas City, June 14th to 17th. Any accessory manufacturer planning to exhibit next year should remember that all space was sold out very early for the Milwaukee convention held in May of this year.

New Laminated Fiber Recharge



An expendable, laminated fiber disc recharge with four to ten times the useful life of cellulose, waste or redwood has been designed by the William W. Nugent & Co., Inc. for the full flow filtering of large quantities of oil. It is classed as an extended area recharge because its actual filtering area is greater than the area of its container. In a recent test on a 1000 hp. supercharged diesel engine at an oil company's pipe line station, the new laminated disc recharges kept the oil cleaner (0.02% by volume) for a period of 3500 engine hours or nearly 12 times as long as the cotton waste recharges ordinarily used. The laminated discs remove foreign solids smaller than two microns and the absorption of these solids after 48 hours of draining at 70° F. is 2½ times the weight of the recharge. Because no chemicals, bleaches or diatomaceous earths are used, the units will not remove vital additives from detergent oils.

Titeflex Catalog

Titeflex helically-wound flexible metal hose and Uniflex helically-corrugated flexible metal hose are illustrated and described in Catalog No. 200 just published by Titeflex, Inc., Newark, New Jersey. In addition to complete descriptions and specifications for flexible metal hose, fittings and assemblies, the catalog contains information for ordering Titeflex flexible metal conduit and ferrules, Uniflex hose assemblies, ignition shielding and components for reciprocating engines, Titeflex bendable pipe and Titeflex high- and low-frequency leads.

Featured in the Engineering Data section are charts showing frictional losses versus flow rates for various sizes of metal hose and conduit. These flow charts are believed to be the first ever offered in a metal hose catalog and can be used as a standard for flexible metal hose of various types. The Engineering Data section also contains complete information on installation and maintenance of metal hose. Another "first" is a completely illustrated story showing how seamed metal hose is manufactured, from metal strip to complete assembly. Other photographs illustrate the construction of Titeflex convoluted metal tubing which is helically-wound from brass, bronze, nickel alloy steel, or monel strip, and of Uniflex seamless metal hose, which is helically-corrugated from bronze, brass, stainless steel, and carbon steel tubing. Both types of hose are available with braids and fittings in a variety of corrosion-resisting metals for 1001 hose applications.



DIESEL PROGRESS

Field Inspection Kit

Accurate, on-the-spot inspection for metal soundness can be made on any metal at any location, no matter how remote, through the medium of a new, all metal, portable Turco Dy-Chek flaw location kit. The light, compact metal kit, which contains enough material to perform many field inspections, can easily be carried in one hand. Dy-Chek materials are applied in the field in basically the same manner as they are applied in the plant. Pre-cleaning is accomplished by wiping the area or part being inspected with a rag saturated with Dy-Chek dye remover. The brilliant red liquid, Dy-Chek dye penetrant, is then brushed onto the surface being inspected. After being allowed to dwell long enough to enter any defects that may extend to the surface of the metal, the excess Penetrant is removed. This may be accomplished either by wiping with a rag saturated with the dye remover, or by brush application of dye remover, followed by a water rinse, if water is available. Since, to insure accuracy, it is necessary to apply Dy-Chek developer by spray, two pressurized sprayers of developer have been provided in each kit. The developer is "fogged" along the surface being inspected until a thin, even white coating of Developer has been applied. The Developer dries almost instantaneously, pulling the hidden red penetrant to the surface at locations where flaws exist. Cracks are indicated as brilliant red lines, while red dots indicate porosity. Depth of defects is indicated by richness and speed of bleed-back.

Contents of the new Turco Dy-Chek kits include: 1 pint dye penetrant, 2 pints dye remover, 2 developer press-spray containers, 1 pint developer (for use where compressed air is available), 3 brushes, 1 magnifying glass, 1 shaker Turco Handi-san hand soap and a complete set of instructions. Turco Dy-Chek is also available in larger quantities for use in the plant for receiving, manufacturing and preventive maintenance inspections. Chek-Spek, a dye penetrant method of flaw location for use on production lines, is also manufactured by Turco. Complete information concerning the new Turco Dy-Chek metal inspection kits may be obtained from Turco Products, Inc., 6135 South Central Avenue, Los Angeles 1, California.

Promoted



Thomas C. Tiearney
The promotion of Thomas C. Tiearney to the Sales Engineering staff of the Honan-Crane Corporation has been announced by D. J. Jones, the firm's manager. In his new post, Mr. Tiearney will service Honan-Crane's Ford Motor Company accounts in Detroit, Chicago, and Cleveland. He holds a degree in Mechanical Engineering from the University of Illinois. Prior to his new assignment he was Assistant Chief Engineer for Honan-Crane in the Detroit area. Honan-Crane, a subsidiary of Houdaille-Hershey Corporation, is a leading manufacturer of oil filters, oil and coolant clarifiers, sump cleaners and automatic materials-handling conveyors. Home office is in Lebanon, Ind.

Powerful Companions for Your Engines

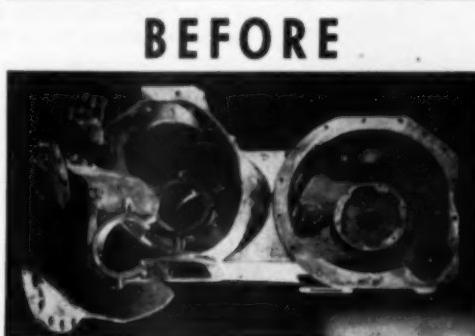


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NOT HOPELESSLY DAMAGED!

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Communist machine-gun fire dropped him in combat. But whole blood kept him alive, saw him through the hospital. He thanks you for his life.



She'd been exposed to polio. A new serum, Gamma Globulin, made from blood, helped ward off the dread disease. She thanks you for her life.



A tornado whipped suddenly across her home town. She was badly injured by falling debris. But a quick operation, several transfusions pulled her through. She thanks you for her life.

Three grateful people say:
"We're **HERE** ...
because you were **THERE!**"

Each one of these people is alive today because someone gave blood.

If you've given blood before, you know how easy it is—how quick and painless. And you know what a wonderful feeling it is when you realize that what you've done may give another person his life.

Now you are asked to give blood . . . again and again. And you can do it safely every 3 months.

Because America's need for blood has increased enormously—for our armed forces, for accident and disaster victims at home, for new disease-fighting serums.

Many a life hangs in the balance! Will you help? Call your Red Cross, Armed Forces or Community Blood Donor Center today!

BUSINESS EXECUTIVES CHECK THESE QUESTIONS

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- | | |
|---|--|
| <input type="radio"/> HAVE YOU GIVEN YOUR EMPLOYEES TIME OFF TO MAKE BLOOD DONATIONS? | <input type="radio"/> HAS YOUR MANAGEMENT ENDORSED THE LOCAL BLOOD DONOR PROGRAM? |
| <input type="radio"/> HAS YOUR COMPANY GIVEN ANY RECOGNITION TO DONORS? | <input type="radio"/> HAVE YOU INFORMED EMPLOYEES OF YOUR COMPANY'S PLAN OF CO-OPERATION? |
| <input type="radio"/> DO YOU HAVE A BLOOD DONOR HONOR ROLL IN YOUR COMPANY? | <input type="radio"/> WAS THIS INFORMATION GIVEN THROUGH PLANT BULLETIN OR HOUSE MAGAZINE? |
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Light or semi-solids

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BRONZE, STEEL, STAINLESS STEEL— $\frac{1}{2}$ "-36" I.D.
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This outstanding ferryboat forms a vital link of Highway U.S. 101 which connects Victoria, Canada with Tijuana, Mexico. This vessel provides the connecting link across the Columbia River at Astoria, Oregon. Power is provided by a model Z-6 UNION Diesel which develops 800 horsepower at 320 r.p.m.

The UNION DIESEL ENGINE Co.
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DIESEL ENGINE CATALOG

The purpose of this little advertisement is to tell you about Volume 18 of DIESEL ENGINE CATALOG which is now available, entirely revised and rewritten. This is the 18th edition of the book that has earned the name of "the bible of the industry."

All smart diesel engine salesmen carry this book around in their car. When they run into some new competition with which they are not too familiar, the DIESEL ENGINE CATALOG gives them full, accurate information when they need it most.

The consulting engineer keeps this book in his reference file. It immediately gives him all data on diesel engines coming within a given horsepower range, speed range and weight range.

People who sell, people who buy, people who use diesel engines need this new, fully illustrated, up-to-the-minute volume. It has been completely revised and expanded. Orders are now being accepted for this latest edition. Price \$10.00 prepaid.

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TO SHUT DOWN AN ENGINE AT A
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SYNCHRO-START Governors are provided with adjustment for increasing or decreasing the shut-down speed while engine is running.

They are made to standard SAE dimensions of a battery ignition distributor. They may be mounted in a distributor take-off or may be driven by some rotating shaft on the engine thru a standard SAE coupling or gear. Governors can also be furnished with Angle Drive Attachment for belt, chain or gear drive or Governor Head can be supplied for use with any specially designed shaft or casting.

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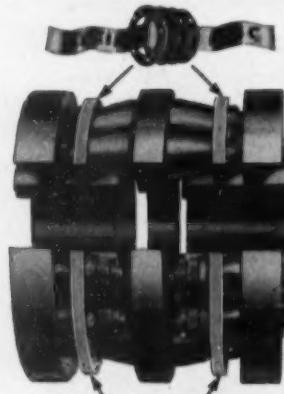
SYNCHRO-START PRODUCTS, INC.

Automatic Engine Control Equipment
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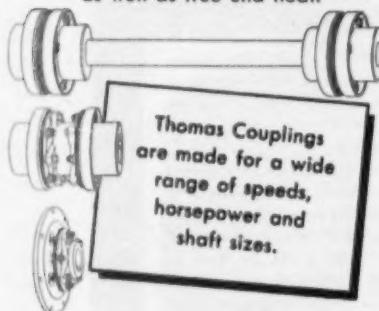
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Specify THOMAS ALL METAL FLEXIBLE COUPLINGS for Power Transmission to avoid Costly Shut-Downs.

DISTINCTIVE ADVANTAGES	
FACT	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

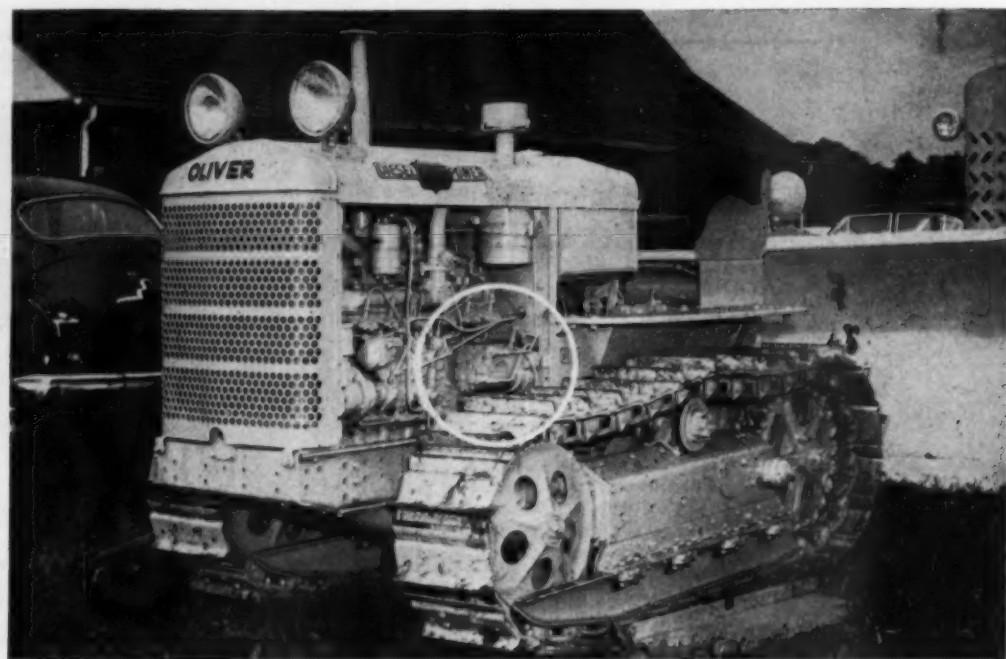


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PERFECT BALANCE UNDER ALL
CONDITIONS OF MISALIGNMENT

NO MAINTENANCE PROBLEMS
ALL PARTS ARE
SOLIDLY BOLTED TOGETHER

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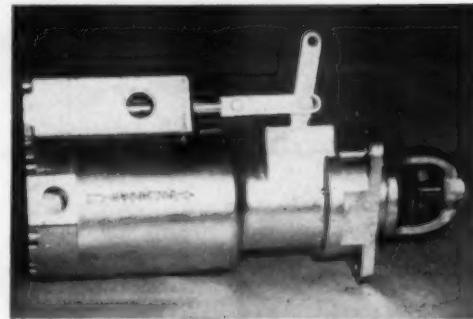


An Oliver diesel tractor showing the Hydrotor motor (circled) and the reservoir.

UNVEILED for the first time to the general public on June 30th was a new and entirely different type of hydraulic cranking motor. This singular new device is called the Hydrotor and is the product of Hydramotive, Inc. It is designed for quick starting of heavy duty engines, eliminates the use of storage batteries and electric or pneumatic starters for cranking these engines.

The Hydrotor, although just released to public view, has been tested for over 73,000 "starts" with no visible resultant damage. Other tests have been conducted by the Oliver Corp. and General Motors Diesel Division. This new hydraulic cranking motor solves a long-standing problem of quick, dependable starting under the toughest, most hazardous conditions. Hydrotor has a record of developing quick starting on heavy duty engines at both sub-zero and at extremely high temperatures. Hydrotors come in 3 sizes to fit and crank most internal combustion engines (diesel or gas).

Claimed advantages of the new Hydrotor starter are: 1. Efficient, independent cranking at all temperatures in all climates. Tested successfully at minus 65°F. to plus 150°F. 2. Higher cranking speeds with less bulk weight results from higher torque characteristic of hydraulic motor constructed from aluminum permanent mold casting. 3. Two cranking systems in one, since Hydrotor used in combination with recharging pump provides automatic cranking with hand pump available for emergencies. 4. Protection while operating in hazardous areas. The Hydrotor being non-electric and of aluminum construction is completely explosion proof. 5. A practical replacement for ordinary cranking systems. It is smaller and lighter, yet more powerful than electric or pneumatic starters. 6. Adjustable cranking speed since Hydrotor will operate over a range of speeds and slow enough to adjust timing or free engine to maximum rating. 7. Minimum maintenance because closed hydraulic system does not require periodic check-ups as do electric or pneumatic systems. Present cranking



Close-up of the Hydrotor, new hydraulic cranking motor.

systems using batteries or air receivers as a source of energy may be deadlined through failure of the energy source. With the Hydrotor this failure is avoided.

For installations requiring frequent starting, a small displacement engine driven pump and unloading valve are furnished to automatically recharge the hydraulic accumulator during engine operation. The complete system, including the automatic recharging pump will operate in the same manner as an electric or pneumatic system. However, the advantages of the Hydrotor hydraulic cranking system is that energy can be readily restored to the accumulator by a few strokes of the hand pumps whereas a discharged battery or a depleted air receiver may result in complete failure of the motive power.

Details and literature on this new Hydrotor cranking motor are available by writing DIESEL PROGRESS, File 106, Box 8458, Cole Station, Los Angeles 46, Calif.

YOUR COPY OF DIESEL ENGINE CATALOG in its eighteenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. \$10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

Gulf Coast Diesel News

By Michael T. Pate

A. F. JAMAIL & Sons, Houston, have secured through Buda Engine & Equipment Company an automotive type supercharged diesel, rated at 120 hp., The Buda diesel, model DTS 468, will power a high-speed truck.

HUMBLE Oil & Refining Company has taken delivery through Buda Engine & Equipment Company, Houston, of a 75 hp. Buda diesel to power a portable tank cleaning rig at the company's Baytown, Texas refinery.

BETHLEHEM Shipbuilding Corp., at Beaumont, Texas, has bought three 125 kw. generator sets, each powered by a Waukesha 6-NKD diesel, to be used as prime power units on a tender for the Gulf Oil Corporation.

HOUSTON Contracting Company, Houston, Texas, has bought through Big 3 Welding Equipment Co., Houston, six 300-amp. Lincoln Model S-7068 welding machines, each powered with a General Motors 271 diesel, Model 2055.

H. BROWN Supply Company, Eunice, Louisiana, has bought through Waukesha Sales & Service, Houston, a model 6WAKD diesel to power a deep well pump.

GAYLAN Savage, Bay City, Texas, has purchased through Stewart & Stevenson Services, Inc., a General Motors 6030-C diesel, rated at 150 hp., to drive a deep well turbine pump for irrigation.

SUNNYLAND Construction Company, Rayne, Louisiana, has purchased through Stewart & Stevenson Services, Inc., Houston, a General Motors Model 24103 Quad 6 diesel, delivering 520 hp. at 1600 rpm., to power a Model 20-P Oilwell mud pump.

TODD Shipyards, Inc., Galveston, Texas, has bought through Mustang Tractor & Equipment Company a model 15000 Caterpillar industrial diesel, to be used in repowering a locomotive crane in the shipyard.

ANDERSON Brothers Corporation, Houston, has bought 13 Lincoln model S-7068 300 amp. welding machines, each powered with a General Motors 271 diesel, model 2055. The units will be used on the contracting company's active pipe-laying spreads.

M. C. RIBBLE Company, Albuquerque, New Mexico, is equipping a motor crane to be used in the Hobbs, N.M. area, with a Model 135-DBK Waukesha diesel, delivered by Waukesha Sales & Service, Houston.

KERRVILLE Bus Company, Kerrville, Texas, has purchased through Cummins Sales & Service, Inc., Houston, two NHB-600, 200 hp. Cummins diesels to be used as replacement motors on two of its bus units.

APPOINTMENT of Earl Studdard as sales manager for Mustang Tractor & Equipment Company, 7777 Washington Blvd., Houston, Texas, distributors for Caterpillar in Southeast Texas, has been announced by Otis Massey, Mustang president.

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FORCE FEED
LUBRICATORS



Why it Pays to Select Manzel Lubricators

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Manzel Lubricators supply the exact amount of oil needed at each wearing point, reducing oil consumption as much as 90%.

They are furnished as standard equipment on leading makes of engines, and machinery. Or they can be installed on your present equipment.

We will gladly have a Manzel lubricator engineer submit recommendations without obligation. Just write...

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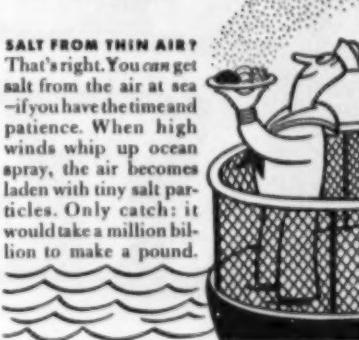
275 BABCOCK STREET
BUFFALO, NEW YORK

AIR-MAZING FACTS

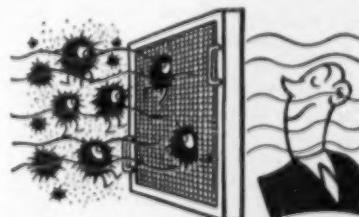
BY O. SOGLOW

SALT FROM THIN AIR?

That's right. You can get salt from the air at sea—if you have the time and patience. When high winds whip up ocean spray, the air becomes laden with tiny salt particles. Only catch: it would take a million billion to make a pound.



SOUND IDEA FOR DIESELS. Noisy diesel air intakes cause employee fatigue and annoy neighbors. But Air-Maze filter-silencers hush the racket while they clean the air.



BAD AIR GETS FRESH START! Air-Maze panel filters keep damaging dust and grit out of engine rooms, diesel locomotive cabs, offices, etc. They're all-metal, cleanable, have high dirt-holding capacity and low pressure drop. Available in a wide variety of types and sizes.

WHETHER YOU BUILD OR USE engines, compressors, air-conditioning and ventilating equipment, or any device using air or liquids—the chances are there is an Air-Maze filter engineered to serve you better. Representatives in all principal cities, or write Air-Maze Corporation, Cleveland 28, Ohio.

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... pointing the way to fact-finding and time-saving in the selection of diesel, dual-fuel or gas engines for your particular application. Your source of information, to be of any value to you, must be up-to-date. It must include all the latest facts and figures. That is why you need the latest edition of DIESEL ENGINE CATALOG on your desk, at your fingertips.

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The diesel industry is fast growing and competitive. New engines and improvements on older models are constantly being announced by the builders. Your reference must be as up-to-date as the engines on the market. DIESEL ENGINE CATALOG is that kind of reference book. Unless you make use of the latest edition, Volume 18, you are not getting the information you want and need. Products of every major engine manufacturer are described and illustrated in Volume 18. Specifications are included.

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Enter my order for a copy of the DIESEL ENGINE CATALOG, Volume 18, edited by Rex W. Wadman, for which I enclose \$10.00 (plus sales tax if for delivery in California). Copies may be ordered in the Sterling Areas by remitting \$4.00 to DIESEL PROGRESS, St. Paul's Corner, Ludgate Hill, London, E.C.4.

NAME.....

TITLE..... COMPANY.....

ADDRESS.....

CITY..... ZONE..... STATE.....

Florida Diesel News

By Ed Dennis

AT TAMPA, the Skipper Trawler Co. received five 3 kw. Onan diesel generating sets from the Tampa Armature Works for use on their shrimp trawlers.

REPOWERED: the menhaden fishing boat *Evelyn L. Willis* with 2 model 110 GM 275 hp. diesels. Other menhaden boats that operate from the Moss Point area are the *Tracy Corbett* with two GM 275 hp; the *W. B. Blades* and *Benson H. Riggan*, each with 350 hp. Waukesha.

DIESEL Marine Engineers of Jacksonville have recently moved into their new and modern plant. The firm operated by popular Don Cox and S. O. Hansen have installed all the latest shop equipment; facilities have been expanded to provide for more sales and service on Superior and Sterling diesel engines, Snow Nabstedt reduction gears and Bowers Marine batteries.

NEPTUNE QUEEN, a former 83 ft. P.T. boat recently converted to an excursion boat to carry about 280 passengers was repowered with two GM 6-71 diesels rated at 165 hp. and one Superior model D diesel engine.

THE E. G. Durek, a Tams designed shrimp trawler built by Diesel Engine Sales of St. Augustine, was named for Eric G. Durek, manager of Florida Diesel Engine Sales at Jacksonville, is powered with a model 110 General Motors 275 hp. diesel.

KON-TIKI is the new 67x20 shrimp trawler owned and built by Costa Buzier of Apalachicola, powered with a 300 hp. Cummins diesel and 4:1 reduction gears. She is electronically equipped and will have all modern scientific navigation aids; a dream come true for Capt. Buzier.

IN THE Redlands district, the Dawal Farms recently secured a D2 and a D4 Caterpillar tractors plus a 30 kw. International Harvester diesel generating unit.

THE Walling III and Nanu were the latest shrimp trawlers added to the Key West fleet, powered with D13000 Caterpillar diesels, Snow Nabstedt reduction gears, Twin Disc power take-off; packaged by Shelley Tractor and Equipment Co. of Miami.

A SUPERIOR diesel at 840 hp. powered the fishing boat *Sun Jason* as she passed through Florida waters heading north with 600,000 lbs. of fish; refrigeration and electrical power is furnished by 2 Chicago Pneumatic diesel generator units of 170 hp. each.

THE Diesel Corporation of St. Augustine has recently taken over the L. H. Nix Boat Yard and will continue to turn out General Motors and Caterpillar powered shrimp trawlers; L. C. Ringhaver is general manager.

DIESELIZATION of the 8000 mile Southern Railway has now been completed as the fire was drawn recently on the last steam locomotive in service. Harry A. DeButts, president, said "It has taken us 123 years to put out that fire."

A CIVIL DEFENSE INSTALLATION

TRUCK-MOUNTED DIESEL ELECTRIC GENERATING SET



A truck-mounted Diesel Generator set operated by the Detroit Diesel Engine Division of General Motors is currently traveling the country demonstrating the operation of automatic standby power. In cooperation with the Division's distributors and dealers these demonstrations are arranged for architects, builders, city officials, hospital superintendents and others interested in maintaining vital services in institutions where temporary suspension of main line current could have serious consequences.

The equipment consists of a 100 kw. standby generator, a six-cylinder GM diesel engine, switches and automatic controls all arranged on the truck for convenient observation. The usual demonstration calls for a wiring hook-up which routes a building's main line power through the unit's control box. A switch may then be pulled to simulate a temporary power suspension. When this is done automatic controls start the diesel engine and within seconds the standby generator is feeding emergency current into the building. When the switch is closed and the simulated emergency

is ended, the unit continues to run for a specified number of seconds and then, if the full restoration of main line power has continued, the set stops immediately. In some instances current is routed through the unit to a resistor which is equipped with lights. These go off and on showing the cycle from main line to emergency and back to main line current.

With the installation of this type of equipment the inconvenience of temporary power suspension is lightened or eliminated entirely. Radio and television stations may stay on the air with practically no interruption. In hospitals and other institutions, lights, elevators, and other essential equipment may continue in operation. Prisons, fire department alarm systems and airports can also protect the public and maintain important functions by means of this equipment. Information regarding the unit's itinerary may be secured from Detroit Diesel Engine Division's authorized outlets throughout the country or by writing the Division at 13400 W. Outer Drive, Detroit, 28, Michigan.

New Dealership

In Emeryville, California a new Northern California distributor for the Waukesha Company has been established under the name of Waukesha Pacific Equipment Co. This brand new plant integrates Waukesha automotive and industrial diesel sales, service, and parts into one location. A full stock of parts, an assortment of complete Waukesha power units, and factory trained, experienced mechanics available for servicing and rebuilding equipment are provided in this opera-

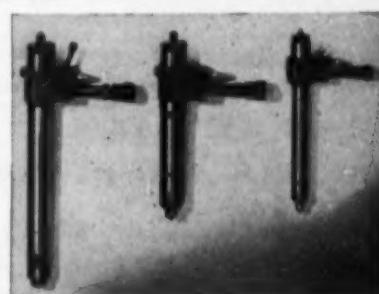
tion. Mr. Carroll F. Reeves, who has been representing Waukesha in the industrial diesel field for the past seventeen years in Northern California, is the general manager of this new dealership.

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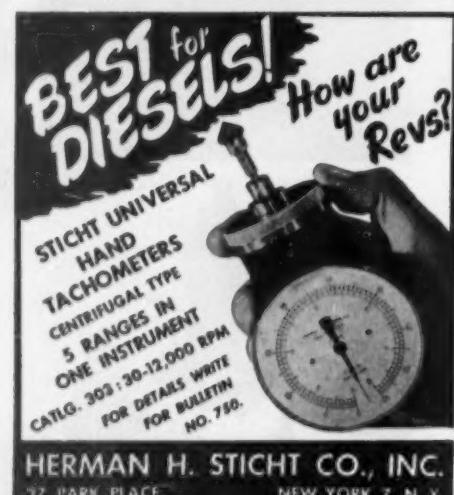
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Two new 1947 unused 475 BHP 5 cylinder Baldwin Model VG Diesel Engines, each connected to Worthington Horizontal Triplex Double Acting Pump, both units with Falk Couplings and other accessories. Location Ohio, immediate delivery. Direct inquiries to The Buckeye Pipe Line Co., Joseph Steele, Purchasing Agent, Room 2200, 30 Broad St., New York 4, N.Y.

Quick Disconnect Coupling



Hallett sales manager, Robert McIntosh, announced recently that Hallett has expanded production facilities and their sales force to promote their new

quick disconnect couplings for coaxial cable applications. The highlights of these multi-purpose units are: 1. The smallest size yet produced with the quick disconnect feature. 2. Injection molded and machined Teflon insulators. 3. Beryllium copper receptacle connections that surpass a high voltage potential of 7,000 volts rms. at 60 cycles for one minute. 4. All metal parts are silver plated to .0002 min. of maximum density. 5. Conforms with all government specifications.

Manufacturing Arrangement Announced

International Harvester Company and Bucyrus-Erie Company have just announced an arrangement under which Bucyrus-Erie industrial tractor equipment will be sold, distributed and serviced by Harvester to its industrial power distributors, and eventually will be manufactured by Harvester.

For many years Bucyrus-Erie has been an important manufacturer of allied equipment for Harvester's industrial tractors. Major items of Bucyrus-Erie manufacture for this purpose have been bulldozers and scrapers. This equipment has been sold and serviced directly by Bucyrus-Erie to Harvester distributors. Bucyrus-Erie has need for additional facilities for the manufacture of its products other than tractor equipment and for that reason has decided to withdraw eventually from the manufacture of this equipment for the Harvester line of industrial tractors.

Major features of the arrangement are: 1. Bucyrus-Erie will continue to supply Harvester distributors directly with allied tractor equipment until Jan. 1, 1954. 2. After Jan. 1, 1954, Harvester will take over the sale, distribution and servicing of Bucyrus-Erie tractor equipment, purchasing its requirements from Bucyrus-Erie up to the limits of that company's present tractor equipment capacity, and reselling to Harvester distributors. 3. Over a

period of time, and without interrupting the continuity of production, Bucyrus-Erie will discontinue the manufacture of its present line of tractor equipment and Harvester will then manufacture these products. The new arrangement will mark the first time that Harvester has undertaken the supply of a line of allied equipment to its industrial distributors. Financial details of the agreement between the companies were not announced.

Open Chicago Offices



Frank W. Edwards

The Stanley Engineering Company opened Chicago offices at 409-10 of the Utilities Building, 327 LaSalle Street, Chicago 4, Illinois on August 1, 1953 for the purpose of providing improved consulting engineering service to industrial and other clients in the Chicago area. The main office will continue to be located in Muscatine, Iowa. Mr. Frank W. Edwards is in charge of this office. Since 1948, Mr. Edwards has been director of Civil Engineering at the Illinois Institute of Technology. On temporary leave, he was general manager of the Centennial of Engineering held in Chicago in 1952. Prior to his association with the Illinois Institute of Technology, his experience included teaching at Carnegie Institute of Technology and at Pennsylvania State College and a number of years with the United States Engineers with major responsibility on design of civilian and military projects. He is the author of a number of engineering articles. Mr. Edwards is a member of the American Society of Civil Engineers and is president of the Illinois Section. He also belongs to the American Society of Mechanical Engineers, Western Society of Engineers, and is a member and past president of the Chicago chapter of the Illinois Society of Engineers.

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West Coast Diesel News

By Fred M. Burt

TO POWER a new 57 ft. steel shrimp boat at Santa Rosalia, Baja California, from Shepherd Marine, Los Angeles, a 120-hp. Caterpillar diesel engine with Twin Disc reverse and reduction gear.

FOR FIRE protection at Inyokern (Calif.) Naval Test Station, two 170-hp. Buda diesels on hangar deluge system fire pumps; two 200-hp. Buda diesels on deepwell pumps for water supply.

SUPPLIED by Crofton Diesel Engine Co., San Pedro, Calif., a 47-hp. General Motors diesel with 3:1 reduction gear for Al Loveless' boat *Georgie*.

POWERED with 275-hp. supercharged Cummins diesels are three big Euclid, single engine scrapers purchased by Hughes Construction Co., Torrance, Calif. for large volume earth-moving.

FOR City of Porterville (Calif.) sewage treatment plant, a 52-hp. Buda natural gas engine converted for use of sewage gas or propane as standby fuel.

FOR lights and power on Bechtel Corp. contract at Vermillion Dam (near Fresno), from Anderson-O'Brien Co., Los Angeles—diesel electric sets, Delco generators, GM engines—three 75-kw. (250-hp. engines); one 40-kw. (133-hp.); one 50-kw. (200-hp.).

AS THE beginning of a large gas lift program Shell Oil Co. has installed three 265-hp. natural gas engine driven completely unitized Clark compressors at their Ventura (Calif.) field.

POWERED with 225-hp. Caterpillar diesel engines, three Cat DW20 tractors purchased for work on Isabella Dam, Kernville, Calif. have been modified by Shepherd Tractor & Equip. Co., Los Angeles to provide sufficient traction for bulldozing and pulling sheepfoot tampers; rear wheels have been widened 7 inches with addition of up to 8 tons of steel weights at rear.

AT El Toro Marine Air Base for standby power for control tower, a 180-hp. Buda diesel, driving a Century generator, equipped with King-Knight automatic starting controls.

A NEW snow compactor built by Wood Mfg. Co., North Hollywood, Calif. for government use in Arctic areas is powered with a 4-cyl. 133-hp. General Motors diesel engine.

FOR THE San Diego Transit System, 20 of the new GMC air suspension 45 passenger buses with GM torque converters, powered with 200-hp. GM diesel engines.

FROM Engineering Controls, Los Angeles, a Vapor Phase system to replace radiator for cooling of 1500-hp. turbocharged Cooper-Bessemer diesel driving 1,000-kw. generator to supply power for City of Breeze, Ill.; low pressure steam from Vapor Phase used for power plant heating.

FOR Watson E. Jarrett, contractor of Altadena, Calif., a new Lima shovel powered with a 300-hp. supercharged Cummins diesel engine.

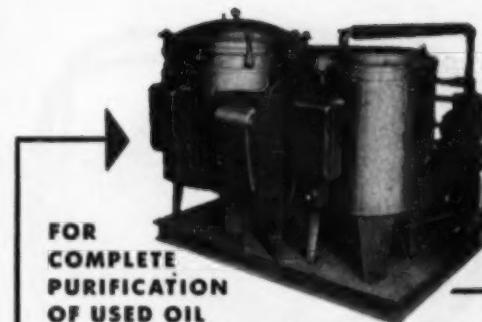
A 125-hp. Buda natural gas engine driving a Layne-Bowler deepwell turbine pump has been installed by the Anaheim-Eucalyptus Water Co., Anaheim, Calif.

FIVE 200-hp. Cummins diesel engines (making a total of 16 for the same purpose) used by Inet, Inc., Los Angeles electrical manufacturers in building jet engine starting equipment; each engine powering two special 30-kw. low voltage generators.

ADDED to the Pacific Electric fleet of diesel motor coaches (now 350), 35 new 48 passenger GMC units with 200-hp. GM diesel engines; with the new development of air suspension using air from engine systems with 8 bellows and leveling valves.

A NEW Madsen 4,000 lb. asphalt concrete plant for use in road work at Riverside, Nevada by Gibbons & Reed of Salt Lake City, has 80-hp. Caterpillar diesel on dust collector exhauster; 160-hp. Cat on pugmill mixer; and 156-kw. diesel electric set for other motors.

AS PART of about \$500,000 value in construction equipment, mostly dieselize, purchased in U.S.A. by a Rio de Janeiro contractor, a "Little Monster" 1,000 lb. batch Madsen ac. plant (30-40 tons ac. hourly) powered with a 4-cyl. 78-hp. General Motors diesel engine.



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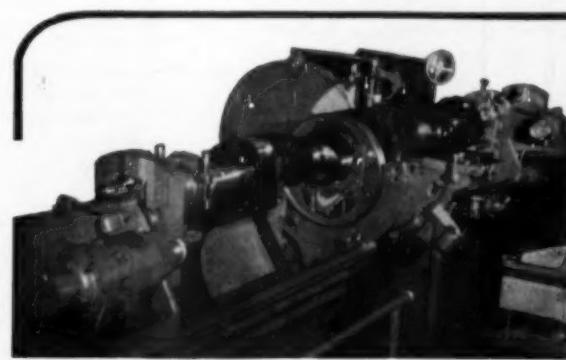
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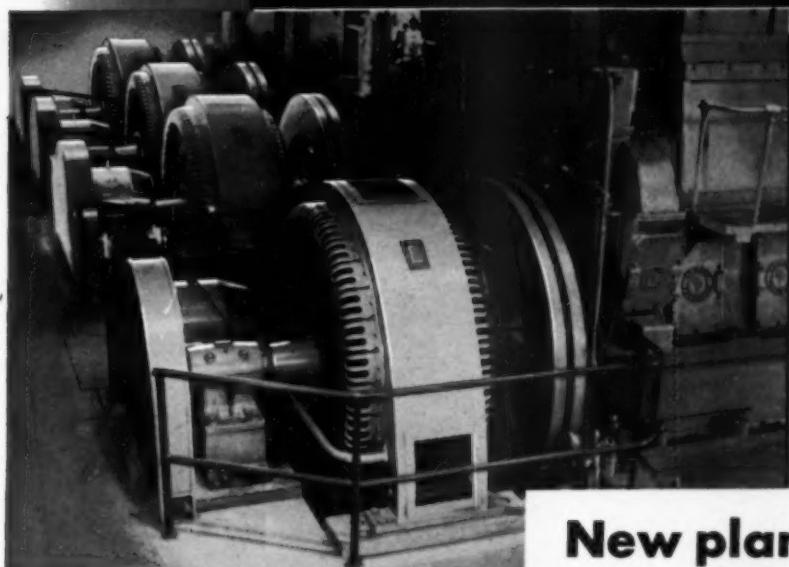


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Close-up of one of the four generating units at Rantoul.



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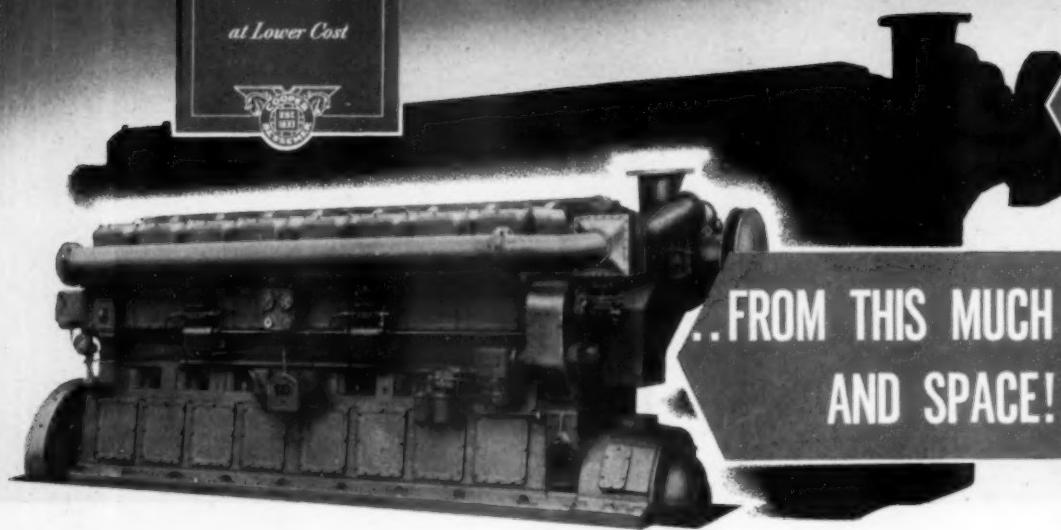
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